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A MANUAL
OF
GYNECOLOGY

BY

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PREFACE TO SECOND EDITION.

THE revision of this manual is prompted by the progress which has been made in gynecology during the last decade. The text has been thoroughly revised and reillustrated, and the chapters on Menstruation, Pelvic Inflammation, Ectopic Pregnancy and Sterility have been entirely rewritten. More space has been given to the pathology of the several lesions and more emphasis placed on its relation to the symptomatology and diagnosis.

The salient points in diagnosis have been italicized in order that the reader may more readily grasp the basic facts. On the other hand, all theoretical discussions have been omitted, and in questions that are still debatable, the writer has presumed to give his individual opinion.

Many of the illustrations have been redrawn and many new ones added—reproduced from the original drawings by Emily Freret and Ruth Oliver of the actual specimens in the Author's collection.

The Author again takes occasion to express his thanks to his Associates for their coöperation, assistance and kindly criticism, and also to assure the Publishers of his appreciation of their courtesy.

J. O. P.

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MANUAL OF GYNECOLOGY.

CHAPTER I.

PHYSIOLOGY OF THE FEMALE GENITAL ORGANS.

THE important functions of the genital organs in women are the processes associated with ovulation, menstruation, and reproduction. These consist of:

1. The alterations in the uterus and ovaries by which menstruation is established, and by which its periodic recurrence is maintained and finally discontinued.
2. The relation of the sexes in copulation.
3. The fecundation and nutrition of the ovum.
4. The processes by which the matured product attains a separate existence. These functions occur at definite physiological periods in the life of the human female, *i. e.*, during the period of infancy and adolescence, or childhood, and the period of sexual maturity.

These are followed by the period of senility in which all the sexual organs atrophy, and ovulation and menstruation cease. In other words, the sexual organs of women pass successively through a stage of preparation, a stage of activity (sexual maturity) and then become extinct.

During the period of infancy and adolescence, which includes the period of life from the *time of birth until puberty*, the uterus increases in size and thickness; the uterine mucous membrane, which prior to the sixth year is folded like that of the cervix, becomes smooth; the vagina is elongated and the vulva becomes larger and more rounded.

The transition from adolescence to maturity, which marks the completion of the developmental process, is indicated by the appearance of menstruation, and is called *puberty*.

PUBERTY.

Puberty marks the beginning of the period of maturity. At this time the individual begins to functionate sexually. It usually occurs between the twelfth and fifteenth year.

The age at which the developmental process is completed and ovulation and menstruation are established varies with race, social condition, heredity, climate, and relations with the opposite sex. *Puberty may begin as early as the tenth year* or may not be manifest until atfer the eighteenth. Puberty occurs earlier in the Latin races than in the Anglo-Saxon or Teutonic. It is earlier in the natives of hot climates than in those of the north.

The influence of race and climate on puberty is evidenced by the observations of Das; that Hindus and Mohammedan girls in India menstruate two or three years earlier than English girls born in India, while the latter arrive at puberty at an earlier age than they do in England.

City girls and those raised in affluence mature younger than girls reared in the country, or who are obliged to work before development is complete; while brunettes usually menstruate earlier than blondes.

When menstruation is established and recurs regularly before the age of thirteen it is called *precocious.* With the advent of puberty the girl undergoes many physical and psychic changes. The sexual organs with their accessory structures become fully developed and increase in size and vascularity. The uterine body and fundus develop rapidly, the tubes gradually lose their excessive torsion and become shorter and straighter, the Graafian follicles reach their full growth, distend the ovarian tunic and rupture.

The figure of the child takes on the general physical characteristics of the woman, becoming more rounded, from an increase of adipose tissue. The breasts enlarge and frequently become painful; hair appears on the mons veneris and labia majora; the glandular structures, especially the mammæ, become more fully developed. Marked changes occur in the nervous system, as the intellect, emotions and will of the girl change to those of the woman.

Full sexual maturity is seldom obtained before the eighteenth or twentieth year. When the development is complete and the individual is fit to begin the processes of maturity it is called the *period of nubility.*

Women who become pregnant very early and give birth to children before twenty are subject to a greater mortality, arrive at the menopause earlier, and are apt to age prematurely.

The Influence of the Internal Secretions in the Development of the Sexual Organs.—Woman is dominated by her internal secretions both in her physical and psychical development.

The ovaries dominate the functional activity of the sexual organs. If the ovaries are healthy and active the other pelvic organs are likely to be the same. The ovaries furnish the individual with an internal secretion; which is produced from the corpus luteum, follicles and the interstitial gland. The corpus luteum, however, is the most actively secreting portion. While the ovarian secretion is not essential to the continuance of life, it has a marked influence upon the woman's well being and seems to maintain a harmonious balance between the other internal secretions. The interglandular harmony of the perfect woman.

Like other glands the ovaries may hypo- or hyperfunctionate. Hypofunction in children produces infantilism while in adults it causes amenorrhea and obesity. On the other hand, hyperfunction may result in premature sexual development in the child or produce menorrhagia in the adult.

Double oöphorectomy in adults is followed by an artificial menopause, while if the child is deprived of its ovarian secretion, eunuchoid habits, genital atrophy and a neuter type of development follows.

The ovarian secretion brings about the phenomena of menstruation and on its withdrawal menstruation ceases. The internal secretion of the ovary is the one stimulant that is essential to the physiological activity of the reproductive organs. While some of the other ductless glands have an influence on menstruation, their secretion only seems to activate the ovarian products. This is shown in the relation of the pituitary body to the development of sexual life. The hypophysial secretion is the antagonistic complement to that of the ovary, as is evidenced in hypofunction after puberty which results in marked adiposity, genital atrophy and diminished sexual function. On the other hand, hyperfunction causes the early increases in genital activity found in acromegaly which is rapidly followed by functional atrophy. The anterior lobe enlarges during pregnancy and this increase may persist for several years giving the patient the appearances characteristic of acromegaly and even causing a prolonged amenorrhea.

The thyroid participates in the glandular enlargements of pregnancy by a physiological hypertrophy with an increase of the thyroid secretion which is believed to assist in the regulation of the basic metabolism during the period of gestation. During menstruation there is a transient enlargement of the thyroid. Disturbances of this gland are apparently responsible for anomalies in the menstrual function, as is evidenced in the functional amenorrhea, menorrhagia and metrorrhagia so often seen clinically. Although these conditions are of a distinctly opposite nature they are often benefited by the administration of thyroid extract.

Certain clinical facts have been observed which tend to strengthen the belief that the thyroid has some relation to sexual development *i. e.*, patients suffering from Graves' disease are usually sterile, while when pregnancy does occur in a patient with exophthalmic goiter, the symptoms are intensified and the prognosis becomes more serious. On the other hand, individuals with underdeveloped genitalia symptomatic of hypothyroidism, myxedema, and cretinism are often clinically improved by the administration of thyroid gland.

Our observations have shown that many cases of uterine myomata are associated with enlargement of the thyroid and if a total extirpation of the uterus and ovaries is made, that these patients suffer permanently from hypertension. This, we think, is clinical evidence of the inter-relationship between the thyroid, ovaries, and suprarenals; for it is noted that the adrenals are hypertrophied during menstruation and pregnancy: Precocious and abnormal sexual development is found associated with marked increase in the size of the suprarenal glands; while on the other hand in Addisons' disease, which is due to a diminished function of the adrenals, sexual activity is diminished and atrophy may occur.

The Hygiene of Puberty.—This transitional state is fraught with danger for the individual, and special care should be taken to regulate the habits and the life of the girl as she arrives at puberty. This regulation should apply to open-air exercise, ventilation of living rooms, sleep, diet, bowel movements, bathing, literature and associations.

Exercise.—The growing girl should have systematic exercise daily for one or two hours in the open air, such as walking or golfing. She should also be taught the value of calisthenics upon her muscular development. Fifteen or twenty minutes of "setting-up" exercises, taken each morning before the bath, are exceedingly beneficial.

Study.—Too much home work is required of the average schoolgirl. While study should have its place, it should not rob the girl of the time needed for exercise, recreation, or sleep, and the growing child should be free from overtax or worry.

Clothing.—The clothing of the girl during her transition from childhood to womanhood is most important. Unfortunately, fashion dictates the form of dress for all classes in our country. All parts of the body should be evenly and adequately protected. Light or moderate-weight clothing is preferable. Changes in weather should be met by the addition or discarding of extra wraps, not by changes in underwear. Waist constriction should be avoided. When corsets are worn they should be properly laced, being snug at the hips and sufficiently loose above to allow for abdominal breathing and freedom of motion. The clothing should be supported from the shoulders, not from the hips. Circular garters are injurious.

Sleep.—The growing girl requires sufficient sleep, for *physical rest aids tissue building. Eight or nine hours of sleep daily is a necessity.*

Diet.—Diet is of special importance. Regular meal hours must be insisted upon. Pastries, ice-cream, sodas, large quantities of meat, sweets, fried foods, stimulants, tea, coffee and condiments are to be avoided. Cereals, fruits, vegetables, bread, butter, milk, eggs, and a limited amount of meat should make up the diet of the adolescent girl. *Animal food should be especially avoided just before and during the menstrual period.*

Bathing.—On rising a daily tepid bath of fresh or salt water maintains bodily cleanliness and secures the proper action of the skin. The bath should be followed by vigorous friction with a coarse towel to secure the needed reaction. Cold bathing is stimulating, but is not as beneficial as the tepid bath, especially in the anemic and chlorotic.

Ferruginous tonics and plenty of sunshine are especially required at this period of life, as in assuming the new functions of womanhood the blood-stream sustains an increased load, and the red cells and the percentage of hemoglobin are prone to fall below the normal.

MENSTRUATION.

Synonyms.—The *menses;* the *catamenia;* the *monthly periods;* the *monthly sickness;* the *monthly flow;* the *courses;* the *turns.*

Menstruation may be described as a "periodic discharge of blood from the uterus," accompanied by the shedding of portions of the epithelium of the body and the fundus, as well as that lining the utricular glands near their orifices (Sutton).

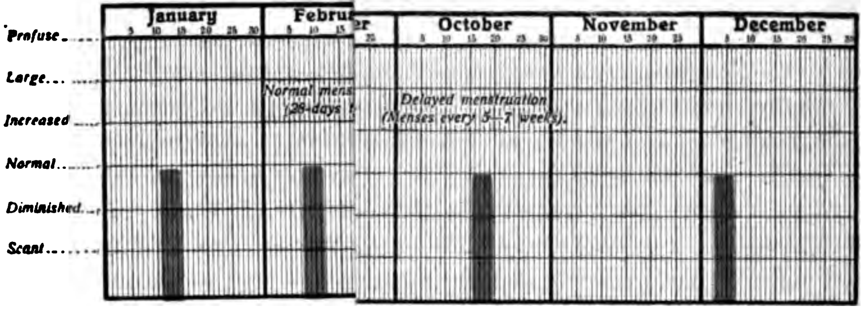
The internal secretion of the ovary is the provocative impulse of the menstrual cycle while the uterine response occasions the menstrual flow.

The menstrual discharge is not pure blood, but consists of blood mixed with the glandular secretions and desquamated surface epithelium of the endometrium. The hemal constituent comes from the subepithelial capillary plexus of the endometrium partly by a diapedesis of the red cells and partly from rupture of the capillary walls. It detaches portions of the overlying epithelium as it breaks through and becomes mixed with mucus of the utricular glands. It is a dark bloody fluid, thin and slimy in character, which contains blood corpuscles, mucus, leukocytes, epithelium and stroma shreds. The epithelial cells predominate toward the end of the flow. The normal flux is not clotted, as the relative balance between thrombokinase and thrombolysin in the normal endometrium and presence of mucus from the uterine and cervical glands hinders coagulation. When, owing to conditions, the flow is excessive or the gland secretion is deficient, a circulatory stasis is produced and clots are present.

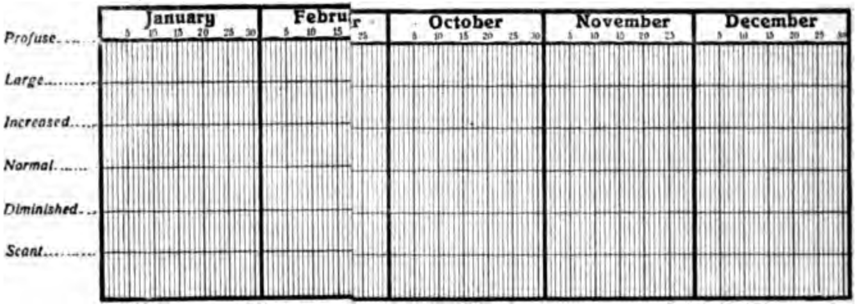
As we have already stated, the ovaries dominate the development and functions of the reproductive organs and the corpus luteum is recognized as the most actively secreting portion of the ovary.

Fränkel has demonstrated the influence of the corpus luteum by experimental work on the menstrual function.

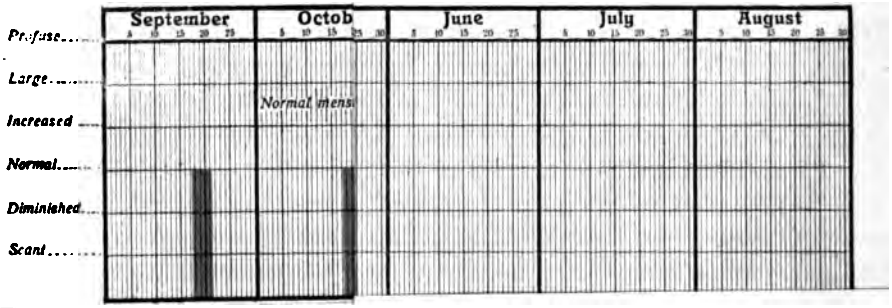
I *Types of Menstruation.*



II *Pregnancy with haemor*



III *Graviditas tubaria with*



1. Hence it can be definitely stated that the corpus luteum is a gland with an internal secretion; *and following each ovulation the true corpus luteum is redeveloped in the functionating ovary* and its secretion dominates the occurrence of menstruation. This secretion on entering the blood stream determines the nutrition of the uterus; especially that of the endometrium, for on the connective tissue of the endometrium it excites a hyperemia which in turn is followed by a hyperplasia.

2. It prepares the uterus for the reception, retention and nutrition of the fecundated ovum and if fecundation has not taken place, it establishes the menstrual flow.

The endometrium is the menstrual organ. At menstruation its thickness is increased by hypertrophy and vascular engorgement to about 8 mm. Menstruation is immediately dependent upon an intense congestion of uterine mucosa and a menstrual diapedesis (according to Fränkel). There are three distinct events with anatomical changes in the menstrual cycle:

1. The premenstrual congestion and swelling of the endometrium precedes the actual flow by about six or seven days. During this stage the structure of the endometrium resembles the formation of decidua. The superficial capillaries are engorged, the stroma is edematous, the glands are enlarged with swollen epithelium which diminish their lumina.

2. The period of actual hemorrhage or menstrual discharge lasts for from four to six days. During this time the secretion of the glands is increased, the superficial areas of the endometrium are infiltrated with blood and areas of the superficial epithelium are detached or the cells separated and allow the menstrual blood to escape.

3. The stage of postmenstrual involution includes; the regeneration of the endometrium, which takes for its accomplishment from seven to ten days. In this stage the epithelial surface is repaired by the proliferation of cells, the bloodvessels shrink and the stroma cells lose their edema. The blood in the menstrual flow is due partly to a diapedesis of red cells and partly to the rupture of minute capillaries in the subepithelial plexus of the endometrium. The tubal mucosa takes no active part in the menstrual process.

In the United States the average age of the first menstruation is the fourteenth year. When the periods occur earlier than the tenth or not until later than the eighteenth year it is *considered abnormal.*

Menstruation in the majority of women occurs *every twenty-eight days,* while the intermenstrual interval may vary from twenty-one days to five or six weeks and still be within the normal limits. The individuals' custom as to regularity, duration and the amount of menstrual flow lost is known as her *menstrual habit.* Slight irregularities are not necessarily inconsistent with health. Normal periodicity is the rule, but may not always prevail at the start.

Menstruation generally continues for thirty to thirty-five years. This is known *as the period of sexual activity* in women. *It begins with puberty and ends at the menopause.* The menses are generally suspended during pregnancy and lactation, and cease after complete ablation of the ovaries. The quantity of blood lost varies in different individuals. The average amount is estimated to be from four to six ounces, the normal minimum being two and the maximum ten.

The average duration of the flow is from three to five days; a flow of less than two or more than eight days is indicative of an abnormal condition.

When the menses are absent or greatly decreased the condition is known as *amenorrhea.*

A *prolonged or an excessive flow* occurring at the regular time is called *menorrhagia.*

Metrorrhagia is an abnormal uterine hemorrhage occurring at times other than the regular menstrual epoch.

When menstruation is preceded or attended with severe pelvic pain it is dysmenorrhea.

Type refers to *periodicity.* Every woman establishes a type of menstruation which she follows more or less perfectly during her menstrual life. The type may change, however, after marriage or a labor, a miscarriage, an operation, etc.; yet it is considered as normal so long as regularity is maintained.

Habit.—*Habit refers to the quantity and the duration* of the flow. Women are more apt to be abnormal in *habit than in type.* Each menstrual period is generally preceded and attended with some degree of nervous excitation, malaise, a sense of pelvic weight and pressure, fullness and tenderness of the breasts, *swelling* of the *thyroid* gland, a slight rise of pulse and temperature, and an increase in body weight (Belfield) which may actually exceed a pound an hour, for several hours owing (1) to the increased absorption of oxygen, and (2) to a decreased elimination.

The uterus and pelvic viscera become engorged with blood and the uterus is enlarged, turgid and sensitive. *Pain or disability during the period is pathological.*

1. *When menstruation begins before the usual age it is called precocious.*
2. *When it begins after the time of the typical period it is termed delayed menstruation.*
3. *A periodic flow of blood from some other mucous membrane than that of the uterus is known as vicarious menstruation.*

The hemorrhage usually comes from the nasal mucous membrane. The condition is but rarely seen.

OVULATION.

Ovulation is the discharge of an ovum from a matured Graafian follicle. Menstruation and ovulation are not wholly interdependent, though as a rule, they are often coincident. Exceptionally, ovulation may occur at any period during the intermenstrual interval or before menstruation is established or after it has ceased, as is shown by the occurrence of pregnancy before the advent of puberty and subsequent to the climacteric.

Most authorities agree that ovulation takes place from fourteen to sixteen days after the onset of menstruation. This allows the corpus luteum which follows to reach the height of its development from the eighteenth to the twenty-fifth day and thus form the stimulus for the next menstrual epoch.

According to Fränkel the following facts explain the periodic occurrence of menstruation:

1. The corpus luteum is a gland with an internal secretion.
2. Following each ovulation this gland is redeveloped in the functionating ovary and its secretion dominates the occurrence.
3. The secretion of the corpus luteum entering the blood determines the nutrition of the uterus, especially that of its endometrium,

in whose connective tissue it excites extreme hyperemia and hyperplasia. It prepares the uterus for the reception, retention, and nutrition of the fecundated ovum; and where the fecundation has not taken place, establishes the menstrual flow.

Clark has shown that menstruation begins at the time the Graafian follicles have reached that stage in their development when they approach the surface of the ovary and rupture into the peritoneal cavity. Each follicle that ruptures is replaced by scar tissue, and when but few follicles remain and the ovary becomes little more than a mass of scar tissue, menstruation ceases and the woman passes on to the menopause.

MENOPAUSE.

Synonyms.—The *climacteric;* the *dodging period;* the *change of life;* the *critical period.*

The menopause is the end of menstrual life and of the functional activity of the ovary. It corresponds to the end of ovulation and the exhaustion of the primordial follicles in the ovary. The internal secretion of the ovary gradually ceases and the generative organs atrophy.

The menstrual life of a woman lasts upon an average of nearly thirty-five years. *The menopause may occur normally any time between the fortieth and the fiftieth year.* It is most commonly established at the forty-fifth or forty-seventh year; later in women who have borne children and have nursed them. The age of menstrual cessation is subject to wide variations. Early and repeated child-bearing at short intervals may shorten the child-bearing period.

The menopause occurs earlier in hard-working and in fat women than those living in affluence. Heredity has some influence on the time of cessation.

The average duration of the menopause is two and a half years. Usually the cessation of the menstrual function is gradual, extending over a period of from one to three years; yet it sometimes ceases abruptly.

The final cessation of the menses may be postponed by chronic pelvic inflammation or by the presence of uterine neoplasms. In typical cases the flow usually decreases in quantity for a few periods, becomes irregular in periodicity, and then ceases altogether.

Menorrhagia or metrorrhagia at the menopause is to be looked upon with suspicion. Any excessive flow from the uterus, bloody or otherwise, which occurs at the time of the menopause is a danger signal and calls for special investigation as to its origin.

Over 50 per cent of women who begin to bleed from the uterus after the establishment of the menopause have some form of malignant disease of the uterus.

During this period the woman may complain of vasomotor flushes, vertigo, excessive perspiration, faintness, numbness, and slight digestive disturbances. All of these clinical phenomena may be exaggerated and be associated with cardiac palpitation, headaches, insomnia, mental irritability, hysteria, melancholia or other psychoses.

The uterine hemorrhage frequently may be prolonged or excessive. *Excessive or prolonged bleeding always should excite suspicion and should lead to a careful examination in order to determine its cause.*

At this period there is an increased tendency to malignant degeneration in the uterus and in the breasts. On the other hand, cessation of the functional activity of the genital organs has a curative effect on certain pelvic ailments, owing to the physiological atrophy which normally takes place.

Profuse and persistent hemorrhage or marked nervous disturbances, as melancholia and other psychoses or erotomania, are ominous. *Enlargement of the uterus occurring after the menopause usually means fibrosis or malignant disease.*

In normal conditions the menopause is attended with little or no disturbance, or the woman will notice that the periods become more scanty, until finally she misses one or two periods. The irregularity continues until complete cessation takes place.

With the establishment of the menopause there are atrophic, physical and functional changes in the sexual organs which are the reverse of those that characterize the pubescent period. The ovaries become small and cirrhotic and cease to functionate.

The Fallopian tubes decrease in size and the folds in the mucous membrane partly disappear.

The uterus decreases in size, and in senility it returns to infantile dimensions. The atrophy of the cervix is marked.

The endometrium atrophies and the utricular glands become obliterated.

The vagina becomes shorter, narrower, inelastic, and its orifice is contracted. The folds in the vaginal mucous membrane disappear. The external genitals undergo atrophy, the labia lose their deposits of fat and become shrunken and shriveled into thin folds of skin, and the slightest trauma; mechanical, chemical, or thermal may excite a vulvovaginitis.

The mammary glands shrink, but the breasts retain their fullness, owing to an increased deposit of fat.

The abdomen enlarges from the development of subcutaneous fat deposits.

Premature Menopause.—When there is a permanent cessation of the menstrual function prior to the age of thirty-two it is considered that the menopause is premature. Such a cessation may be induced by shock, mental affections and ovarian disease which involves the destruction of the ovaries. When in these cases the ovaries are destroyed the ovarian stroma is especially affected, as may be found in double ovarian tumors, sepsis, and chronic inflammatory disease of the appendages.

A premature menopause is usually associated with obesity, and other evidences of hypoplasia of the sexual organs as late puberty, scanty menstruation, dysmenorrhea and sterility. There may be also deficiency or abnormality of the secretion of the other ductless glands.

Early Menopause.—The climacteric is considered to have occurred early *when menstruation ceases between the thirty-second and forty-second years.* It occurs earlier in virgins, blondes, and in fat women. Often no assignable cause may be found. Occasionally the menopause is delayed beyond the normal limit by heredity, child-bearing, uterine growths and malignant degeneration.

The sudden occurrence of the menopause or the production of an artificial menopause by operation is usually attended by marked vasomotor disturbances; such as sudden sensations of heat, flushings, vertigo, suffocation followed by chilliness, clammy perspiration, cardiac palpitation; or such nervous phenomena as irritability, headache, or melancholic depression. The vasomotor disturbances are particularly distressing after the operative menopause.

Management of the Menopause. Proper attention must be given to the woman's general health at the menopause. She must be physically and mentally fit in order to go through this trying period without distressing symptoms. *The blood-pressure is usually increased,* hence the diet should be simple and contain a minimum amount of nitrogenous material. Free action of the skin, bowels and kidneys, should be encouraged. Open-air exercise and sufficient physical rest are especially desirable.

Eight hours sleep in a cool, well-ventilated room, in a bed by herself does much toward quieting the nervous irritability.

In cases of cervical lacerations and relaxed vaginal orifice the usual plastic operations are indicated for prophylaxis against malignant disease of the cervix and senile prolapse of the pelvic organs.

The Flushes.—*Vasomotor Relaxations.*—This is the most frequent symptom for which the woman seeks relief. These may be controlled with bromides in doses of from 15 to 30 grains three times daily, or by the use of ovarian extract in 5-grain doses, two or three times a day.

When the blood-pressure is high, the use of veratrum viride in the form of the fluidextract or Norwoods' tincture, ♏j to v t.i.d.; or thyroid extract grains ij to v one to four times daily is efficient.

The dried corpus luteum in grain-v doses is said to be useful in the artificial menopause, but in our experience administration of the whole gland has been more satisfactory.

Salt baths at bedtime, at a temperature of 104° F; for twenty minutes may be of benefit. The Nauheim bath taken every second or third day, and followed by several hours rest in a quiet room does much toward reducing the vascular tension.

The mental depression may be relieved with small doses of the normal liquid of cannabis indica (♏iv) or ¼-grain doses of the solid extract.

Excessive hemorrhage may be controlled by the hot vaginal douche, 110° to 120° F; or the vaginal pack in conjunction with such drugs as stypticin, ergotin, hydrastin, styptol, thyroid extract, and atrophin sulphate.

Curettage is indicated in persistent bleeding and has special diagnostic value in excluding malignancy. *The curettings should always be submitted to a competent pathologist for examination.*

CHAPTER II.

GYNECOLOGICAL DIAGNOSIS.

EACH gynecological lesion presents a more or less distinct clinical picture, with its history, its suggestive symptoms and its characteristic and confirmatory signs.

The suggestive symptoms are obtained from the clinical history, which should be the first part of each case record.

The characteristic and confirmatory signs are elicited by the physical examination and laboratory tests.

Too much importance cannot be laid upon the necessity of making a clinical record of each patient. This should include information on the following points:

1. The date at which the patient is first seen.
2. The name in full, and if married, her husband's first name.
3. The residence.
4. The age.
5. The nationality.
6. The occupation.
7. The social condition whether single, married or widow, white or colored.
8. *The chief complaint*, noting the particular symptom or group of symptoms for which she seeks relief.
9. *The Family History.*—This should include inquiry as to the presence of neurosis, tuberculosis, syphilis, or any predisposition to malignant tumors; and whether her parents are alive, or if dead, what were the causes of death.
10. *The Personal History.*—Should include a description of any previous constitutional, circulatory, digestive, nervous, infectious, respiratory or renal disease; or previous operations (for what, when operated; and by whom, and if possible, what was the nature of the procedure).
11. *The Menstrual History.*—Inquiry into the menstrual history should record the age at which the menses began, the interval between periods, their duration, the amount of blood lost; and

whether or not the flow was accompanied with pain, notation should be made of the time at which the pain occurs, whether it is pre-, co-, or postmenstrual, whether or not there has been any change in the character of her periods since marriage, or following a labor, a miscarriage or an operation. *The date of the last menstruation,* and the presence or absence of any intermenstrual discharge (leucorrheal or bloody) in character.

12. *Miscarriages.*—Noting the number, at what period of gestation, the dates of each, how treated, and their complications.

13. *The number of children,* with the character of the labors, occurrence of complications, and the date of the last labor.

14. *The puerperia* and their complications.

15. *The Present Complaint.*—When and how it first began, its duration, and a history of the symptoms in the order of their occurrence.

Interpretation of the Clinical History.—Proper interpretation of the clinical history is of paramount importance in making an accurate diagnosis. The name and residence are important from a business standpoint. While locality has possible effects on the patient's health; certain localities are unhealthful; being malarious, rheumatic, etc., while others seem to favor the development of goiter.

Age.—*Special Disturbances are Found at Different Periods of Life.*—Inflammations of the lower genital tract are expected in infancy. Vulvovaginitis is not uncommon in little girls. Congenital anomalies as imperforate hymen, uterine flexions, etc., are often first noted during adolescence, while infections, displacements and traumatisms, the result of gonorrheal infection, labor or abortion, are commonly met during the period of sexual activity; malignant disease is most frequent at or near the menopause.

A large abdominal tumor occurring in a woman under thirty-five is likely to be an ovarian cyst, while an abdominal growth arising from the pelvis in a woman of forty or more is apt to be a fibroid.

Genital hemorrhage in the woman of child-bearing age will suggest the possibilities of abortion, ectopic, hydatid and chorio-epithelioma or fibroid, while bleeding occurring after the menopause may be due to a cervical polyp, senile endometritis or malignant degeneration.

Nationality and Color.—Cancer is a disease of the Caucasian and is believed to be less frequent in the negro, than in the white race, this frequency however, differs in different localities. The colored race is especially prone to fibroidal disease and keloids.

Social Condition.—The social state of the woman has a special bearing on gynecological disease; symptoms resulting from malformations and malpositions of the pelvic organs are always aggravated by marriage and the consequent sexual relations. A single girl suffering from amenorrhea, menorrhagia, or metrorrhagia suggests a constitutional disturbance, though the possibility of pregnancy must always be kept in mind. On the other hand, in a married woman, menstrual abnormalities suggest the possibility of ectopic gestation, or some condition resulting from gestation. Urethral and bladder irritation in a recently married woman immediately impresses the physician with the possibility of Neisserian infection. The truth or falsity of any such suspicion should always be determined by the physical and bacteriological examination.

The personal history as to the life, habits and previous health of the individual is of great importance, and has a suggestive value in making the diagnosis. A vulvovaginitis in infancy or an attack of scarlet fever or any of the exanthemata occurring just prior to puberty may explain a cervicitis and leucorrhea in a young girl. Rheumatism may be a cause of dysmenorrhea. Chronic constipation frequently aggravates the menstrual pain and prolongs the menstrual flow. Chronic renal disease may produce an amenorrhea, while chronic endocarditis often affects the quantity and duration of the monthly blood loss.

A previous operation may be the exciting cause in the extension of infection. A curettage may produce salpingitis as an extension from a quiescent gonorrheal endometritis, or a parametritis or peritonitis in a postabortal endometrial inflammation. *Nothing is so important in the clinical history as the data obtained relative to the normality or abnormality of the menstruation.*

Hemorrhage or Uterine Bleeding takes either the form of a menorrhagia or a metrorrhagia when it appears in the latter form, the metrorrhagia is or is not preceded by a period of amenorrhea or some condition of the pregnant state, hence the type of hemorrhage almost always serves to indicate its cause. *Menorrhagia,* or a prolonged

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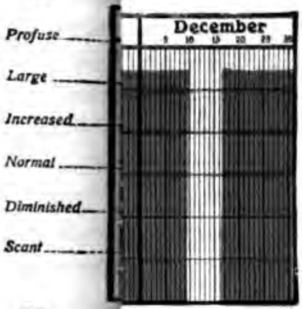

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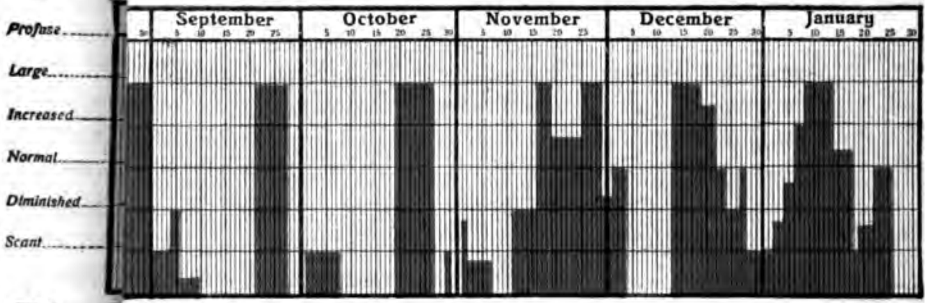
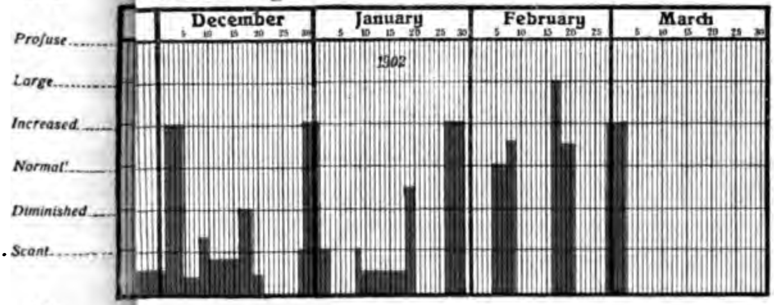


III M hemorrhage.



IV M

or increased menstrual flow, may be due to any condition which tends to prolong or increase the menstrual congestion as chronic adnexal disease, or endometritis or subinvolution or relaxation of the uterus, or to any condition which causes abnormal vascularity of the uterus; as a myoma or submucous fibroid, or which may modify the regulating apparatus of the nervous or endocrine systems, as is found in the menorrhagia associated with general debility, tuberculosis, etc.

In metrorrhagia or intermenstrual hemorrhage, it is not necessary to look for any cause which has to do with the physiological pelvic congestion; for intermenstrual hemorrhages always suggest the possibility of some condition of the pregnant state when preceded by amenorrhea or of cervical polyp, carcinoma, acute inflammation of the uterus or adjacent viscera or circulatory disturbances; as uncompensated heart lesions, etc., when it is not preceded by such a history.

Uterine hemorrhage which is preceded by a variable period of amenorrhea always suggests a condition due to the pregnant state; as ectopic gestation, incomplete miscarriage, hydatid mole, etc.

Pain.—Pain is of special diagnostic importance as a gynecological symptom. When the pain is associated with the menstrual function it is known as *dysmenorrhea. The* (*a*) *time of its occurrence,* (*b*) *its location,* (*c*) *its character and the area of its radiation* suggest to the physician the tissues involved in the pathological lesion. Pain in the external genitalia accompanies inflammatory and other diseases of the vulva, while pain in bladder and urethra is a symptom of urinary lesions. The occurrence of comenstrual cramps in the lower abdomen of a virgin, during the first few hours of the menstrual flow, will suggest a flexion or developmental anomaly of the uterus.

A sensation of weight, dragging and fullness in the pelvis accompanied by lumbosacral backache indicates a heavy uterus with insufficient pelvic supports and is usually relieved when the patient assumes the recumbent position.

Hypogastric pain and backache continuing through the flow is a symptom of intramural fibroid or metritis. Pain which occurs before and during the period and is referred to only one side and radiates down the thigh, suggests unilateral ovarian disease or incarceration of a pelvic tumor.

Pain in both sides occurring during the intermenstrual period, aggravated by standing and relieved on assuming the recumbent position, is a symptom of parametritis or varicosities in the broad ligament.

Intermenstrual pain of ovarian origin is referred almost invariably *to one or the other ovarian region.* In some cases the pain changes from one side to the other, from month to month for ovulation does not always take place in the same ovary. It usually occurs at the time that the ovary prepares for the next menstruation, about nine days preceding the first day of the next period or nineteen days from the beginning of the last menstruation.

The pathology which produces this interference with ovulation is in all probability an inflammatory change in the stroma and tunic of the ovary, making the ovarian capsule so dense that the passage of the ovule from the deeper position in the ovary is difficult and the tension about the growing follicle is increased. The pain is only relieved when the ovule fights its way to the surface and is free to ripen and rupture. This type of pain is not uncommon following cases of puerperal infection which have involved the parametrium and pelvic peritoneum. These infections almost invariably produce a perioöphoritis which if it persists for any length of time so changes the stroma and the covering of the ovary that it interferes with normal ovulation.

Unilateral inguinal pain which is increased during the premenstrual congestion and by standing or walking suggests a parametritis or one of its sequelæ, *i. e.*, a shortened or thickened broad ligament or varicosities in one side of the pelvis. *In chronic pelvic peritonitis* the menstrual epoch is *preceded for several days by general abdominal soreness.*

In gynecological affections the pain is generally located in or referred to the inguinal, hypogastric or lumbosacral regions. *Inguinal or iliac pain* may be due to lesions of the tubes or ovaries, varicosities, inflammation or scars in the broad ligaments, or adhesions or disease of the adjacent viscera, the appendix, the cecum or sigmoid.

Inguinal or iliac pain is more commonly noted on the left side and is due probably (1) to the greater frequency of left sided cervix tears; (2) with the occurrence of left sided parametritis as an extension of cervical infection; (3) to the greater tension of the left broad ligament because of the inclination of the uterus to the right, and the arrangement of the venous circulation. The left ovarian vein enters the left renal at right angles and passes behind the sigmoid flexure of the colon to reach it, the frequent fecal impaction in this part of the bowel favors a circulatory obstruction. *Hypogastric pain* is felt above the pubis and usually accompanies lesions of the uterus itself; as acute or chronic metritis, acute endometritis, intrauterine tumors or displacements. It is artificially elicited by hypogastric pressure and greatly aggravated by walking.

Backache, sacralgia or *lumbosacral* pain may be due to a cellulitis of the uterosacrals or to a rectal disease, or it may have no connection with any intrapelvic lesion, being due to a myocitis of the lumbosacral muscles or irritation or subluxation of the sacroiliac joints, or to nervous exhaustion.

In considering *backache as a symptom*, careful interrogation is necessary to determine the exact location of the pain. The backache may be referred to the cervical or nuchal region when it suggests neurasthenia, or to the dorsal region between the scapula when the cause may be found in a spinal curvature, disease of the spinal vertebræ, or deficient muscular development, gastric lesions, anemia, neurasthenia, etc.

When the backache is in the lumbar region it may be due to loose kidneys or visceroptosis, especially if it is relieved by lying down; or to a lumbago, or it may be traumatic or rheumatic in origin.

Backache referred to the lumbosacral region is commonly ascribed to uterine or ovarian disease; yet its origin may be in the rectum, bladder, lumbar muscles or sacroiliac joints.

Dyspareunia.—Dyspareunia is difficult or painful coitus. When the pain occurs at the beginning of coitus it is commonly the result of smallness of the vaginal introitus or a hypersensitive hymen or a urethral caruncle, while if the pain is experienced after the penis has been introduced into the vagina and is increased during the act of copulation, the cause is usually found in the smallness of the vagina or some inflammatory condition of the uterus, parametrium or appendages.

Dyschezia or Painful Defecation.—This may be due, when the pain occurs at the time of defecation, to a prolapsed and tender ovary, a retroflexion of the uterus, or to a hemorrhoid or an anal fissure. When it occurs with and persists after the movement, a fissure-in-ano may be suspected.

Labor and Miscarriages.—Labor and abortion have an important etiological relation to many pelvic conditions. Nearly one-third of all gynecological disease is due directly or indirectly to the complications and sequelæ of abortion and labor. Pelvic inflammations, uterine displacements, cervical and pelvic floor lacerations, with more or less prolapse, eversion of the vaginal walls and cystocele are the common lesions which may be looked for after repeated miscarriages, or precipitate or instrumental deliveries.

Frequently all symptoms date from the occurrence of an abortion or the birth of the last child.

Sterility.—Sterility is always suggestive of developmental anomaly and dysfunction of the glands of internal secretion or pelvic inflammation, to the former when the woman has been married for several years and has never become pregnant, and all local evidence of a Neisserian infection can be excluded and the male member of the partnership is potent.

Physical Examination.—The physical examination should be thorough and should include:

1. Observance of the woman's general appearance and physical condition. Observing her complexion, height, weight, figure, noting her temperature, pulse, blood-pressure and respiration; hemanalysis and urinalysis.

2. An examination of her thyroid.

3. An examination of the heart and lungs.

4. An examination of the abdomen which should include mapping out the stomach to determine its size, position, etc.; of the liver, the gall-bladder and the spleen, to determine their size and position; of the kidneys to detect their size and mobility, and of the intestines and appendix to locate points of mass or tenderness. Mensuration of the abdomen; and the location of intra-abdominal masses or tumors and finally; the confirmation or exclusion of those lesions diagnosticated by roentgen rays including the study of solid tumors with the aid of pneumoperitoneum.

5. Examination of the pelvic organs should include inspection and palpation of the external genitals for injuries, inflammation and

tumors. The vaginal outlet for relaxation; the vagina for injuries, growths and anomalies of secretion. The cervix for lacerations, scars and degenerations. The uterus for position, shape, size, consistency and mobility. The Fallopian tubes for displacements and enlargements. The ovaries for enlargement and prolapse. The peritoneum and cellular tissues for mass or tenderness. The urethra for malformations and inflammations. The bladder for tumors and inflammations and the ureters and rectum for strictures and inflammations.

Gynecological Postures.—Certain postures facilitate the physical examination of the patient, and are used in the several gynecic operations, or in giving local treatments.

The Horizontal Recumbent Posture.—In this position the patient lies flat on her back with the head resting on a pillow and the arms placed at the side; the lower extremities are extended. This position is generally used for abdominal examination and in certain cases is best for abdominal operations.

The Dorsal Recumbent Position.—The patient is placed on her back with the hips near the edge of the table; the lower extremities are moderately flexed and rotated outward, while the feet rest on the edge of the table or in adjustable stirrups about ten inches apart. This is the usual posture for vaginal examinations.

The Dorsosacral Elevated Position.—The patient is placed on her back with the hips at the edge of the table; the thighs are strongly flexed on the abdomen and the legs on the thighs, and held in this position with a sheet sling or canvas leg holder. The whole pelvis is then elevated twelve to twenty inches above the surface of the table by placing pillows or a firm cushion under the hips. This position facilitates direct inspection of the bladder with the Kelly speculum.

The Dorsal Elevated Position.—The patient lies upon her back with the head and shoulders elevated twelve to eighteen inches, the thighs and legs partly flexed and the feet resting on the edge of the table. This position tends to relax the abdominal muscles and thus facilitates abdominal and bimanual examination.

The Lithotomy Position.—The patient lies on her back with the hips well over the edge of the table, the thighs and legs are strongly flexed and the thighs abducted and held in this position with a sheet sling (a sheet twisted into a rope). One end of the sheet is passed around the flexed leg below the knee from without inward, and tied or fastened with large safety pins. The sheet is then passed back of the shoulders behind the neck, over the opposite shoulder and fastened to the opposite leg in the manner described. Upright leg holders are commonly substituted for the sheet sling.

The lithotomy position is employed for operations on the external genitals, for plastic operations upon the rectum, vagina and cervix uteri, and for vagino-peritoneal operations.

The Edebohl Position.—This is commonly substituted in hospital practice for the lithotomy. This position is similar to the lithotomy position, except that the legs are only partly flexed and the feet are suspended by Edebohl's upright leg holders, or held by assistants, flexed and abducted well above the body.

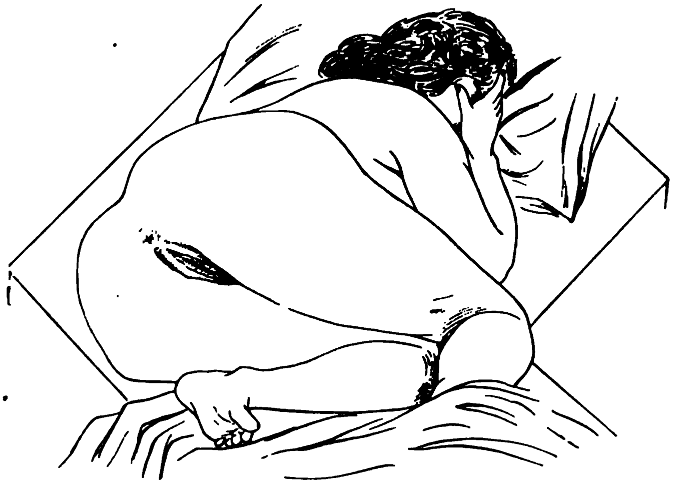


FIG. 1. —The Sims' position.

The Sims' or Left Lateroprone Position.—The patient is placed on her left side at the edge of the table, with the left hip at the left lower corner of the table, and her left arm is behind her back or back of the body and lying parallel with it. The thighs and legs are moderately flexed and drawn up toward the chest, the right knee being higher than and in front of the left, and both resting on the table (Fig. 1).

The Sims' position is used for examination with a Sims' speculum for certain cervical, vaginal, rectal and pudendal operations and for local treatments.

The Genupectoral or Knee-chest Posture.—The patient kneels on the table with the knees slightly separated and the feet projecting over the edge; the thighs are upright, the side of the face rests on a soft pillow, and the upper chest is flat on the table; the arms are thrown back, while the forearms run forward and parallel to the sides of the table, which are grasped by the hands. The thighs must be perpendicular to the surface of the table and the chest must be as close as possible to the knees.

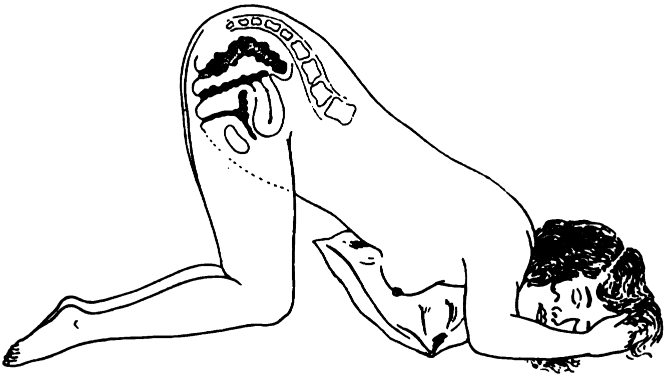


FIG. 2.—The genupectoral or knee-chest posture.

The knee-chest posture is useful for repositing a retrodisplaced or prolapsed uterus or prolapsed ovaries or for colonic lavage or for rectal and sigmoid examinations. It is also used with advantage for direct cystoscopy (after Kelly's method) as it favors air dilatation of the bladder which exposes the ureteral orifices and facilitates direct ureteral catheterization.

The Trendelenburg Position.—The patient lies on the back on an inclined plane of 45 degrees, the legs and the feet hanging over the edge of the table (special tables are devised to give the Trendelenburg posture).

The Trendelenburg position is used to favor the gravitation of the intestine from the pelvis toward the diaphragm, and is generally employed in celiotomy for procedures upon the pelvic organs, in order that the intestines may be removed from the field of operation; and also in certain examinations, as where it is necessary to determine if an abdominal tumor has a pelvic origin.

The Walcher Position.—The patient is placed on the back with the buttocks resting on the end of the table, the thighs and legs hanging down, the thighs well extended. This position increases the conjugate vera by lowering the pubis and throwing the sacral promonotory backward.

The Walcher position is useful in delivery by forceps and in breech extractions while the head is passing the brim, but possesses no advantage in gynecological procedure.

The Pryor Position.—This is a combination of the lithotomy and Trendelenburg postures. It permits the intestines to gravitate out of the pelvis and is useful in vaginal celiotomy and in direct cystoscopy.

Physical Examination.—The student or the physician will be less liable to fail to observe important data in making a physical examination by adopting a definite order of procedure. The patient should empty the bladder immediately before being placed on the examining table. The order of examination should be as follows:

1. Inspection and palpation of the thyroid gland and breasts.
2. Examination of the heart and lungs.
3. Abdominal examination.
4. Inspection of the external genitals.
5. Vaginal examination.
6. Vaginoabdominal or rectoabdominal examination (bimanual).
7. Instrumental examination.
8. Examination of the rectum and bladder.
9. Bacteriological examination of the discharges.

Urinalysis, hemanalysis, blood chemistry, a blood Wassermann and blood-pressure readings have important diagnostic significance, and should be made in order that the physical findings may be properly interpreted.

Abdominal Examination.—To make an abdominal examination the patient should be placed in the horizontal posture, with the knees drawn up sufficiently to relax the abdominal muscles; the waist and corset must be removed and the remaining clothing loosened. *The entire abdomen should be exposed,* the lower extremities being covered with a sheet.

Inspection.—By inspection we note the size and general contour of the abdomen, the shape and outline of any tumor, the pigmentation, the prominence of veins, the presence of linea albicantes, eruptions or scars, the position of the fat pads and the respiratory movements of the abdominal wall. *All tumors of the abdominal wall move with the wall and may be lifted up with it. Tumors of the intraperitoneal organs and viscera move with the respiration under the abdominal wall,* unless adherent to it. The nearer the diaphragm the greater the excursion. Uniform enlargement is common in tympanitis, large ascitic collections and in thin walled cysts filling the entire abdomen, while in the moderately ascitic abdomen the anterior surface is flattened and bulging may be noted in the flanks.

Palpation.—In palpating the abdomen the hands should be warmed and the palpation made with the palmar surface of the finger-tips. Palpation determines the situation, size, shape, sensitiveness and mobility of the intra-abdominal organs and of new growths. It reveals the nature of an abdominal enlargement, making it possible to differentiate between the tense elastic resistance of a cyst and the hard unyielding mass of a solid tumor. It allows the examiner to estimate the general tension and tenderness, areas of muscular rigidity and periodic alterations in consistency. *A pregnant uterus is the only intra-abdominal swelling which contracts intermittently.*

The sense of fluctuation and the presence of a fluid wave help to distinguish between fluid and solid growths. The examiner should begin his palpation by following a *definite order of procedure,* giving attention successively to the kidneys, observing their size, sensitiveness and mobility.

To the liver, noting its contour and size.

To the gall-bladder, noting the tenderness and muscular rigidity over its region.

To the spleen, determining its size and contour.

To the stomach, palpating the pyloric end for the presence of a mass in this location.

To the appendix, examining for tenderness, rigidity, or mass in this region.

To the cecum and sigmoid, for the presence of tenderness or mass.

To the uterus, noting the height and position of the fundus, its smoothness or nodulation.

To the bladder, to determine its distention. *An over-distended bladder presents as a globe-shaped tumor in central position in the lower abdomen, tense and tender.*

The tension, thickness and diastasis of the abdominal walls should also be noted.

Gentle manipulation disarms the reflexes, while having the patient breathe quietly with the mouth open relaxes the abdominal muscles.

Palpation will detect the presence of a tumor or mass and determine its size, contour, origin, mobility, the direction of its excursion and its density. Intraperitoneal tumors as pedunculated fibroids, ovarian tumors, intestinal and mesenteric growths are usually freely movable, but show a tendency to return to the region from which they grew. Retroperitoneal tumors are usually more or less fixed.

Thick and tense abdominal walls may prevent the satisfactory palpation of the abdomen; in such cases an anesthetic may be necessary to overcome the muscular rigidity.

Topography.—For the convenience of description and record, in designating the location of tenderness or of a mass, the abdomen may be divided into four quadrants by an imaginary horizontal line drawn from the ensiform to the pubis, passing through the umbilicus, and a vertical line passing through the same point, thus forming right and left upper and right and left lower quadrants (Fig. 3). Each quadrant has normally a definite anatomical content so that the presence of a mass in one of these regions immediately suggests its possible origin.

Percussion.—Percussion over the abdomen serves to confirm the information already gained by palpation. Percussion aids in outlining the viscera. Thus, the liver, gall-bladder, stomach, spleen, urinary bladder if distended, or the uterus if enlarged may be outlined by percussion; as may, also, new growths, or inflammatory masses be accurately outlined by their area of dullness. Solid and fluid tumors give a flat or dull percussion note, while the hollow viscera are tympanitic.

The area of deep or superficial dullness shows at what portion of the abdominal wall the tumor or fluid is in direct contact, or at what portion the mass is separated by interposed intestines.

The percussion may be deep or superficial. Deep percussion with firm pressure to displace the overlying intestines, is required in cases of deeply seated tumors, or in obesity where superficial percussion is likely to give only dullness over the entire abdomen.

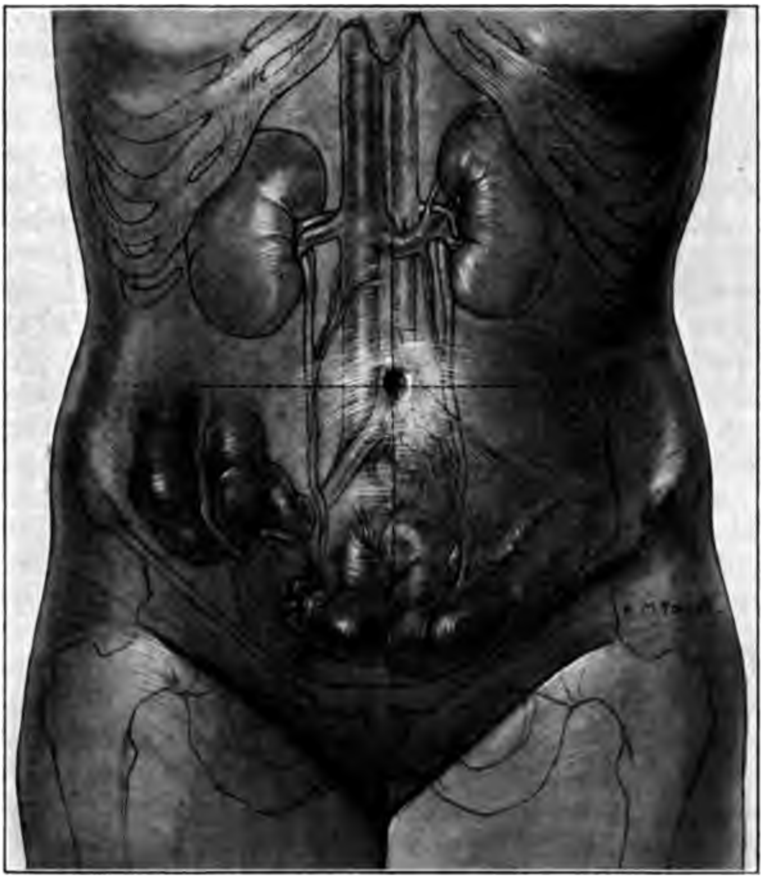


FIG. 3.—The four quadrants of the abdomen, showing diagrammatically the visceral content of each.

To distinguish between free fluid in the peritoneum and solid tumors or encysted fluid, the percussion should be practised in various postures, to show whether the mass or fluid changes its relations when the patient changes her position. The percussion should be made with the patient lying on her back, on her right side, on her left side, sitting and standing.

Mensuration.—The measurements of the abdomen are often of interest for record when it is desirable to know exactly what changes have taken place in the size several weeks or months hence; as in pregnancy, rapidly growing tumors, ascites, etc.

Mensuration is a precise method of determining the rate of growth of an abdominal enlargement. The measurements which should be taken to accurately show the rate of growth of any intra-abdominal mass or collection of fluid are:

1. From the umbilicus to the sternal notch.
2. From the umbilicus to the pubis.
3. From the umbilicus to the right anterior spine.
4. From the umbilicus to the left anterior spine.
5. The circumference of the body at the level of the umbilicus.
6. The circumference of the body at a point three inches above and three inches below the umbilicus.

Auscultation finds its chief field of usefulness as a diagnostic method in the routine of abdominal examination in the diagnosis of pregnancy; where the fetal heart tones, the choc fetal, and the uterine bruit are of confirmatory importance. Auscultation has a contributory value in the diagnosis of peritoneal friction sounds, the increase in the still areas in spreading peritonitis and in the diagnosis of abdominal aneurysm.

Examination of the External Genitalia.—The inspection of the external genitals may be made with the patient in the dorsal position. The sheet should be so draped about the limbs as to expose only the vulva and anal orifices. Inspection should give information as to the condition of (*a*) the labia; which may be the site of malformations, eruptions, ulcers, inflammation, adhesions, hypertrophies, new growths, etc.; (*b*) of the clitoris, for hypertrophy or adhesion of the upper prepuce, and for redundancy of the hood; (*c*) of the meatus urethræ, for prolapse, eversion, caruncle or inflammation of Skene's ducts; (*d*) of the mouths of Bartholin's ducts of the vulvovaginal glands and (*e*) of the fourchette; of the hymen; whether it is intact, lacerated or destroyed. The vulvovaginal orifice should be inspected for scars, venereal ulcers and warts, mucous patches, maculæ gonorrhœica and relaxation; for the presence or absence of rectocele and cystocele demonstrated when the patient bears down and for the presence of new growths and morbid secretions.

Vaginal discharges may be *serous or watery or serosanguineous,* which is always suggestive of possible malignant disease, senile endometritis, a mucous polyp or a degenerating uterine polyp; *mucopurulent,* as is characteristic in chronic endocervicitis; *purulent* as accompanies acute infection of the vagina, cervix or uterus; or, *bloody* as may be found in fibroids, cancer, retrodisplacements, ectopic gestation, miscarriage, etc.

Bacteriological Examination of Discharges.—Smears should be made for microscopical examination of the discharge from the urethra, Bartholin's ducts, the vagina, the cervix uteri and from the interior of the uterine cavity. The significance of the latter cannot be over-estimated in the diagnosis and treatment of acute infections.

Vaginal Examination.—*Inspection.*—Little can be learned from vaginal inspection, except as to the condition of the vaginal mucosa and the character of its secretion. In order to obtain this data the vagina must be exposed with a skeletal or trivalve speculum when the patient is in the dorsal recumbent posture, or with the patient in Sims' position, when the posterior segment of the pelvic floor is retracted by a Sims' speculum held by the nurse.

Digital Examination of the Vagina.—Digital examination in practice usually precedes instrumental inspection. The digital examination is made with the patient in the dorsal recumbent posture. One or two fingers may be used for the exploration, depending upon the size of the introitus. Roughness, tenderness, tumors, cysts, scars and strictures of the vagina, induration and tenderness of the urethra and vaginal injuries may be recognized by digital exploration. Vaginal touch alone may determine the shape, size, position, consistency and mobility of the cervix and the presence of tenderness and induration in the pericervical (parametrial) tissues.

Abdominal-vaginal Palpation (Bimanual Examination).—For this examination the patient should be placed on a suitable table in the dorsal recumbent or lithotomy position to relax the abdominal muscles, the bladder and rectum having been recently emptied.

Anesthesia may be necessary in obese women, virgins, or in women with tense abdominal walls.

The external genitals and vulvovaginal orifice should be cleansed. The hands of the examiner should be scrubbed and disinfected. *In routine examinations it is well to protect the hand with a rubber glove or the examining fingers with sterile finger-cots.* This is especially necessary in the presence of syphilis, gonorrhea, and fetid discharges. The examining fingers are lubricated with glycerin, or liquid soap.

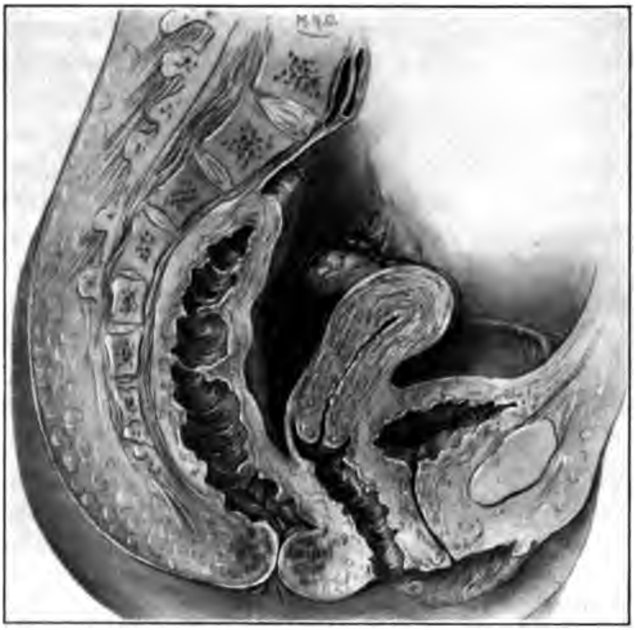


FIG. 4.—Sagittal section of normal female pelvis.

One or two fingers may be used; two fingers where they can be introduced without discomfort to the patient are more effective than one. The *right hand should be used in examining the right side of the pelvis*, while the *left hand has greater facility in determining the contents of the left side.*

The labia are separated by the thumb and the index finger of one hand while the index or index and middle fingers of the opposite hand are inserted into the vulva opening, with the palmar surface pressing the pelvic floor backward. When the fingers are fully inserted into the vagina, the palm of the hand is turned upward and the unused fingers are flexed on the palm. *When the vulva outlet is small, the mucosa sensitive or the hymen intact, a single finger should be employed.* In the bimanual examination, the internal fingers steady the parts, while the external hand over the lower abdomen depresses the abdominal wall and manipulates the pelvic contents. In this manner the pelvic viscera may be outlined and their size, condition and mobility recognized, unless the abdominal wall is very thick and tense.

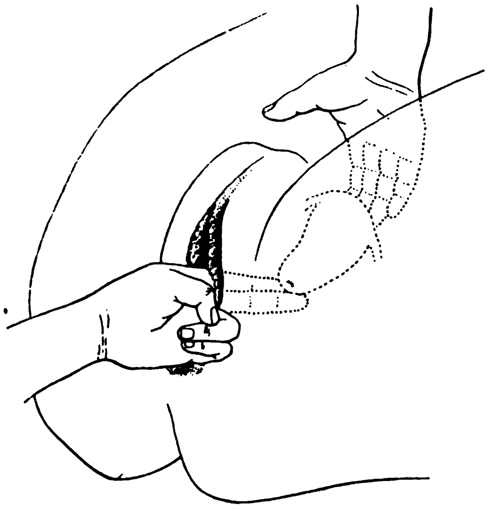


FIG. 5.—Bimanual examination, index and middle fingers in the vagina, below the cervix, external hand depressing the abdominal wall.

Drawing the uterus down with a volsellum caught in the anterior cervical lip, helps materially in palpating the body of the uterus, broad ligaments, uterosacral ligaments and ovaries. With the vaginal fingers we may determine the size of the vulvovaginal orifice, the tonicity of the pelvic floor, the condition of the hymen, the lower end of the rectum, urethra, bladder, pelvic ureters, vaginal walls and the vaginal portion of the cervix. The position, shape, size, mobility and direction of the cervix are also ascertained by the vaginal touch.

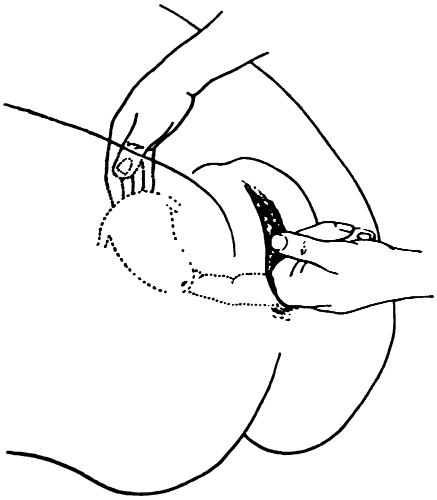


FIG. 6.—Palpating the fornix in bimanual examination.

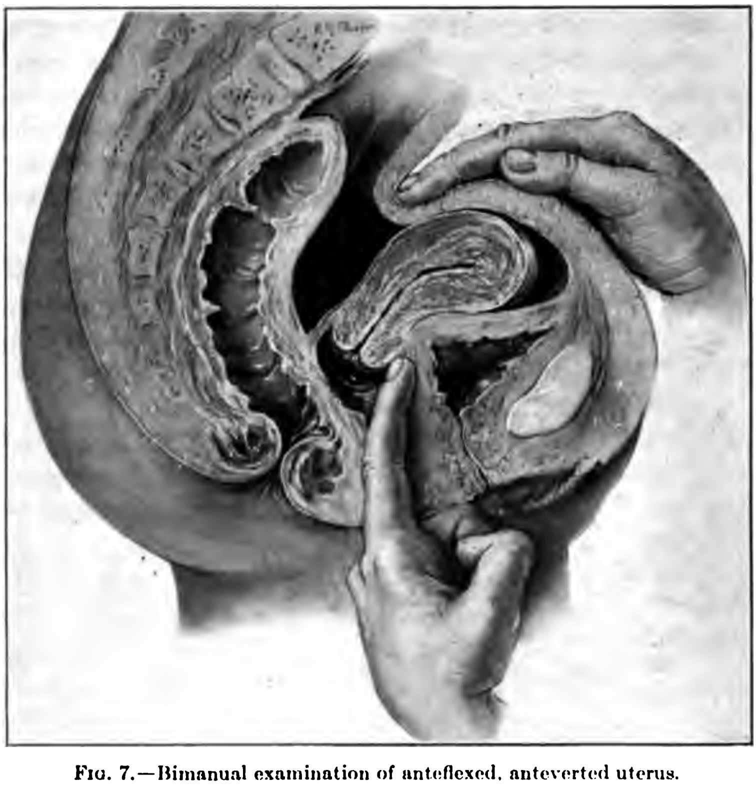


FIG. 7.—Bimanual examination of anteflexed, anteverted uterus.

The external hand presses the abdominal wall down through the superior strait, while the vaginal fingers act conjointly on the *cervix*. This combined examination reveals the exact position of the uterine body; its size, shape, consistency, direction, mobility and sensitiveness. It ascertains the condition of the rectouterine excavation (*cul-de-sac of Douglas*) its contents, the presence of a prolapsed or enlarged ovary or tubes or mass of exudate; the contents of the sigmoid and rectum; whether empty or filled with fecal masses. The shape of fecal masses may be changed by finger pressure owing to their putty-like consistency. Abdominal-vaginal palpation permits the examiner to determine the condition of the uterosacral and uteropelvic ligaments, with reference to thickening, cicatrices and tenderness. By it we recognize the position, size and relation of the ovary to the other pelvic structures. This is done by sweeping the internal fingers which are held well back and high up in one postero-lateral vaginal fornix, toward the lateral pelvic wall while the external hand depresses the abdomen; the ovary may be felt as it slips between them. An enlarged ovary or tube always falls into the postero-lateral *cul-de-sac.*

The Fallopian tube usually cannot be felt by bimanual palpation except when it is thickened by inflammatory processes. Having determined the condition and position of the uterine body, the tube in very thin woman may be traced outward from the uterine cornu toward the pelvic wall by slipping it between the abdominal and vaginal hands. Commonly, however, owing to abdominal tension and the tendency of the ovary and tubes to make one inflammatory mass, total isolation is impossible.

The mobility of the uterus has considerable prognostic importance; this is particularly so in dealing with cancer of the cervix, for when the disease has extended beyond the uterus infiltrating the broad ligaments, and fixing of the uterus on one or both sides; any form of radical operation is contraindicated. Inflammatory disease of the adnexa may fix the uterus by parametrial intraligamentous infiltration. Operation during this stage is frought with more danger than when time has been allowed to effect more or less absorption of the parametrial exudate. The easiest approach to the pelvic organs above the vaginal vault, in all inflammatory conditions of the adnexa, is by the *rectoabdominal touch.* While the external hand depresses the abdominal wall into the superior strait, the index finger (covered with a rubber glove or finger-cot) is introduced into the rectum and explores the posterior surface of the uterus the broad ligaments, the ovaries, tubes and rectouterine excavation —all of which may be felt with the utmost distinctness.

Artificial inflation of the bowel and drawing down the uterus in the vaginal axis by traction on the cervix with a volsellum brings the uterus, tubes and ovaries within easy reach.

Rectovaginal palpation, with the index finger in the rectum and the thumb in the vagina is of value in determining the amount of muscle tissue in the pelvic floor, degree of rectocele and location and character of tumors of the rectal vaginal septum, etc.

Occasionally it may be necessary to pass a sound or probe into the uterus to learn the size or direction or the extent of the uterine canal, *but it is always a dangerous procedure.* When it is absolutely necessary to pass the probe or sound into the cavity of the uterus, it must be aseptic and the vagina is retracted and cervix exposed by a Sims' speculum, the cervix should be drawn down and steadied with a tenaculum and the external os sterilized with iodine before the probe or sound is introduced.

Before withdrawing the fingers from the vagina the base of the bladder and ureters should be palpated. The normal ureters are quite small and may be palpated as movable cords passing around the pelvic wall just above the ischial spines to the side of the cervix, to the internal orifice in the bladder. Thickening or sensitiveness in the ureter is readily recognized by vaginal palpation.

Instrumental inspection of the vagina and cervix should follow digital exploration. This is done with a trivalve speculum through which is to be noticed the color, discharge, and redundancy of the vaginal walls. The color, size and shape of the vaginal cervix, the presence of erosions, cystic change, ulceration, friability and the character of the leucorrheal discharge. In suspicious cases of persistent erosion or ulceration a small piece of the affected area should be excised for microscopical examination. Occasionally the interior of the uterus should be explored with the curette for the purpose of removing pieces for pathological examination. A small sharp curette serves best for this purpose.

The proper use of the hands and the intelligent interpretation of their findings are the fundamentals of gynecological diagnosis; instruments have but a small and secondary field.

Rectal Examination.—Lesions of the rectum are so closely related to the pathology within the urogenital tract and so often produce symptoms which simulate those of gynecological origin, that a routine examination of the rectum is imperative.

The rectum should be palpated and inspected for tenderness, ulceration, hemorrhoids, fistula and fissure. With the patient in Sims' position, palpation of the rectum may readily be made with the vaginal fingers; tenderness elicited, and masses recognized, and by eversion of the lower end of the bowel with the fingers in the vagina, the anal orifice and lower two or three inches of the rectum can be thoroughly inspected. Eversion is further promoted by having the patient to strain down while traction is made with the fingers of the other hand upon the surrounding skin surface in lines radiating from the anal orifice.

Instrumental inspection of the rectum should be made through a cylindrical proctoscope with the patient in the Sims' or knee-chest position, thus exposing to view the rectal mucosa. Catarrhal and ulcerative conditions of the lower bowel are easily recognized and treated by this direct method of inspection. The secretions and the valves, fecal impaction or scybalous masses interfere with the examination. It is well, therefore, to have the patient take a small enema, which is expelled on the toilet an hour previous, before attempting to inspect the rectum with a protocoscope.

Fecal masses have three distinguishing characteristics: (1) Their putty-like consistency; (2) their insensitiveness; (3) they may be pushed along to different positions in the bowel.

Examination of the Urethra and Bladder should be a routine part of every pelvic examination. This begins with inspection of the meatus for caruncle, eversion, or redundancy of the mucosa, malformations and for infections of Skene's periurethral ducts, inspection of the urethra from the vesical neck forward by means of the urethroscope, and the inspection of the entire internal surface of the bladder by direct or indirect cystoscopy.

Instruments Necessary for Direct Cystoscopy.—To inspect the bladder with the direct Kelly open-air cystoscope or speculum the following instruments are necessary:

A calibrator, to dilate the external urethral orifice.
A speculum and applicators.
A head mirror or a Farrar direct cystoscope.
A suction apparatus.

The urethral orifice should be thoroughly cleansed with a pledget of cotton wet with an antiseptic solution, and the bladder emptied of its urine with a sterile catheter. The urine withdrawn should be collected in a sterile vessel for microscopical examination. The meatus and urethra are then anesthetized by inserting a pledget of cotton saturated with a 10 per cent solution of cocain just inside the urethral orifice. "In ten minutes the mucosa will be so benumbed that the little conical dilator can be inserted" and the meatus stretched wide enough to readily admit the passage of a 10 mm. speculum. The patient is then placed in the knee-chest posture and the speculum with its obturator introduced through the urethra into the bladder. On introduction of the speculum, when the obturator is withdrawn the bladder becomes distended with air. Any residual urine may be removed with the suction apparatus, or by sponging with cotton balls or gauze strips held in forceps. The vesical field is now illuminated by light reflected into the bladder by a head mirror or by the light in the tip of the cystoscope and the entire inner surface, including the ureteral orifices is inspected. As the speculum is withdrawn, successive portions of the urethra may may be brought into view, and note made of the condition of the urethral mucosa. The bladder should be emptied of air after the examination has been completed.

Cystoscopy with Water Distention.--This is the method commonly used by the urologists. The cystoscope devised by Tilden-Brown or the modification of Buerger is the one best adapted for use in the female bladder.

The patient is placed in the lithotomy posture, and after the external genitals and vestibule have been cleansed, a catheter is introduced and the bladder washed out with a 2 per cent boric acid solution until the return flow is perfectly clear. The bladder is then moderately distended by leaving six or eight ounces of the solution to be retained.

The cystoscope lubricated with sterile glycerin is introduced, the bladder illuminated by turning on the electric light at its tip, and the vesical walls inspected.

This method avoids many of the technical difficulties of direct inspection.

Palpation of the bladder, urethra and *ureters* allows the observing examiner to make many practical and clinical observations. Digital or bimanual examination recognizes tenderness and thickening of the urethra, bladder and ureters, the presence of vesical tumors and calculi, or urethrocele, cystocele or malformations, and also whether pus can be expressed from the Skene periurethral ducts or from the urethra.

It is frequently desirable and necessary to differentiate the urine from each kidney. This may be done by means of ureteral catheterization or segregation and the functional output of each kidney accurately determined.

Bacterial examination of the discharges from the urethra, urethral glands, Bartholin's glands and the cervix are of value in interpreting the symptomatology and physical signs of the individual case, as for example: The presence of the gonococcus in the discharge of the cervix when there is clinical evidence of a pelvic peritonitis modifies the prognosis and determines the line of treatment.

Finally every gynecological patient should be studied individually as to her urinary output and its quality, the blood-picture, and the condition of her nervous and endocrine systems. The urinalysis should be thorough, for the urine gives valuable information as to the metabolism of the body and the condition of the excretory organs.

The analysis should include and note (1) the total quantity in twenty-four hours; (2) color; (3) clearness; (4) odor; (5) reaction; (6) specific gravity; (7) deposit on standing, the presence and estimation of albumin, sugar, urea, uric acid, bile, indican, chlorides and acetone bodies; and a microscopical examination of the centrifuged sediment for casts, blood, pus, crystals, etc.

The bacteriology of the urine frequently aids in confirming or excluding the diagnosis of renal or vesical tuberculosis or pyelitis. Alterations in the blood may be found in many gynecological conditions. The pruritus in diabetics is hematogenous and analogous to the skin irritation in jaundice. In chlorosis there is a deficiency in the hemoglobin in the red corpuscles, while the number of the red corpuscles may be but little below the normal; there is always however, a great discrepancy between the two. The constitutional menorrhagia in young girls are frequently due to this cause.

Examination of the Blood.—The blood is thin, pale and watery. The hemoglobinometer shows the percentage of hemoglobin lowered, while the hemacytometer *does not* show a proportionate decrease in the number of the red corpuscles. Malaria has considerable influence on pelvic disorders, and menstruation is often notably affected by a malarial cachexia.

Abortions occur in the pernicious form. The puerperium may be febrile due to malaria. The discovery of the plasmodium makes the diagnosis.

The blood of syphilitics is inoculable and consequently contagious throughout the entire secondary stage. The histological characteristics of syphilis are essentially an infiltration of round or embryonic cells in the connective tissue of the different organs, producing an inflammatory neoplasm or granuloma, with intra- or perivascular changes in the bloodvessels, as an endoarteritis or endophlebitis. The Spirocheta pallida is found in the walls of the bloodvessels and in the perivascular infiltration; hence the blood reaction becomes an important diagnostic feature. A positive Wassermann reaction is always significant in any abdominal or glandular enlargement.

In inflammatory lesions of the pelvic organs with persistent fever, the leukocyte counts may throw light on the etiology. In postpartal or postabortal sepsis, recovery of an organism from the blood has special bearing on the prognosis and treatment. If sudden and decided hemorrhage is taking place within the abdomen a leukocytosis is usually present. In certain postoperative conditions leukocytosis is of assistance in making a diagnosis of the complication. Intestinal paresis due to a peritonitis always shows a white cell count of 20,000 or more.

A relative increase in the polymorphonuclear percentage indicates the inflammation is spreading.

A marked leukocytosis in the presence of local inflammation is a favorable prognostic, as it indicates that there is a decided vital resistance, while the absence of a leukocytosis in a severe and active inflammation means that the patient's reserve force is exhausted.

A marked anemia becomes dangerous. When the hemoglobin is below 30 per cent; operations when possible should be postponed, until the blood state can be improved by fresh air, sunlight, tonics or direct transfusion of blood.

The serum reaction of the blood in pregnancy is suggested as a recognized adjunct in determining the early diagnosis. The technic, however, is so complicated that many of us feel that serodiagnosis is impracticable and unreliable.

Examination of the Sputum.—A sputum examination and a roentgen ray of the chest may aid in the differential diagnosis of pelvic inflammation, as pelvic tuberculosis is almost always secondary to a primary focus in the lungs. A positive von Pirquet likewise has a contributory value.

The Complement-fixation Test.—The complement-fixation test is useful in identifying those gonorrheal cases in which the gonococcus cannot be demonstrated. Patients suffering from hysteria, neurasthenia, hypochondria or melancholia, often have an exaggeration of their pelvic symptoms without grave lesion. Nevertheless, neuralgias and neuritis may result from pressure due to incarceration of pelvic tumors or perineuritic changes in the pelvic nerves from local inflammation. Hence the gynecologist who aspires to be a diagnostician must be an observer if he will avoid error.

CHAPTER III.

GYNECOLOGICAL DISEASES.

GYNECOLOGICAL diseases may be arbitrarily divided into four general groups, namely:

1. *Those which are due to developmental anomalies*, or malformations; caused by errors of development, as partial arrest or excessive or misdirected growth of the organ.
2. *Those due to inflammatory conditions* of the several pelvic organs and tissues resulting from bacterial invasion by the gonococcus, the staphylococcus, the streptococcus, the colon bacillus, or the tubercle bacillus, etc. A large proportion of the inflammatory lesions within the female pelvis are the direct result of *postabortal* and *postpartal infection*. The gonococcus likewise plays an important role in the etiology of inflammatory lesions of the cervix; tubes and pelvic peritonium.
3. *Those resulting from obstetric injuries* and their sequelæ.
4. *Those caused by neoplasms;* as fibroids, cysts and malignant degenerations.

MALFORMATIONS AND ANOMALIES OF THE EXTERNAL GENITALS.

Hypospadias.—Hypospadias is a condition in which the posterior wall of the urethra is defective or absent. The posterior vestibule is absent and the urethra at its outer portion opens into the vagina. This condition is probably due to an arrest of development with the persistence of the urogenital sinus.

Treatment.—In many instances no treatment is required as the cleft in the posterior urethral wall is insignificant, being well forward of the urethral sphincter and the patient is not inconvenienced by leakage. Occasionally the presence of urinary incontinence demands restoration of the urethral canal and urethrovesical neck by plastic operation on the anterior vaginal wall and sphincter vesicæ muscles.

Epispadias.—*Epispadias in the female is an exceedingly rare anomaly.* It is a failure of union in the upper or anterior wall of the urethra. This may be partially defective or wholly absent. When there is absence of the anterior wall, the condition is commonly associated with cleft clitoris, split pelvis, and extroversion of the bladder. Vesical exstrophy is prone to result in ascending disease of the bladder, ureters, and kidneys from extension of infection or obstruction of the ureters.

Treatment.—The condition may be relieved by extensive plastic operation, using flaps from the abdominal wall for the reconstruction of the anterior urethral wall, or in exstrophy of the bladder where plastic surgery fails the ureters may be transplanted into the rectum. When this is properly done the danger from ascending infection of the kidneys is no greater than from the extension from an ectopic bladder.

Hermaphroditism.—This means the apparent uniting of the two sexes in one organism. This is a condition in which the sexual organs partake of the essential characteristics of both sexes in the same individual. *The sex is dependent upon the nature of the essential sexual gland. True hermaphroditism is extremely rare,* even if it occurs at all in the human subject. In most instances the condition is one of spurious or pseudohermaphroditism. True hermaphroditism means the presence of a functionating ovary and testicle on one or both sides, or an ovary on one side and a testicle on the other, with excretory ducts, whatever the appearance of the external genitals may be. Generally the pseudohermaphrodite is either a male or a female, the apparent characteristics of the opposite sex arising from malformation of the external genitals. *Gynandria* is the term applied to female hermaphrodites in whom the physical characteristics are essentially masculine. When the man resembles the female he is classed as *androgynous.*

A hypertrophied clitoris may be mistaken for the penis, or fusion of the labia may present the appearance of a scrotum and conceal the vulvar orifice. Ovaries which have descended into the labia may simulate testicles, while the internal organs may be irregularly developed.

On the other hand, a rudimentary penis may counterfeit the clitoris or the penis may be perfect and a bifid scrotum may give the appearance of a vulva, especially if the testicles have not descended or are absent. The breasts may be well developed and the contour of the hips and thighs feminine. The male pseudohermaphrodite has testicles; the female, ovaries; the general appearance of the latter may be distinctly masculine. The great majority of pseudohermaphrodites are males. The mental condition of these individuals is generally feeble, or they are poorly balanced. It is often important to determine the sex of such persons for the protection of society.

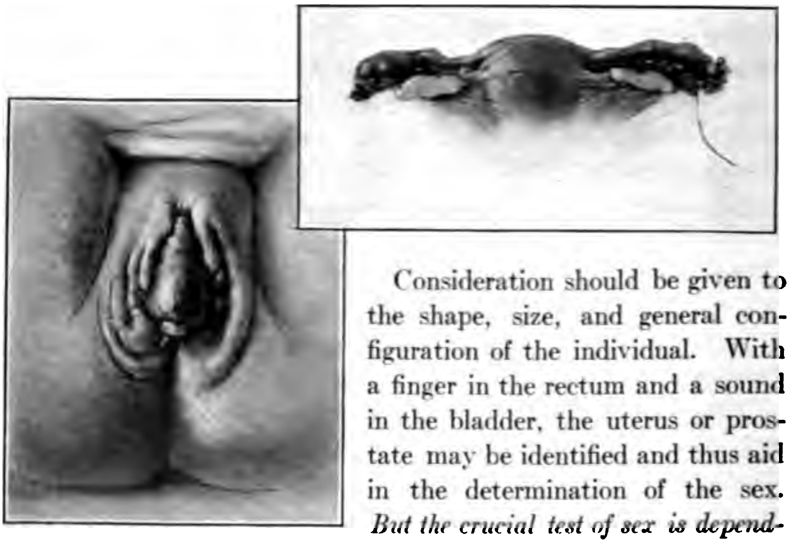


Fig. 8.—Excessively hypertrophied clitoris simulating hermaphroditism. Autopsy showed ovaries and tubes to be normal.

Consideration should be given to the shape, size, and general configuration of the individual. With a finger in the rectum and a sound in the bladder, the uterus or prostate may be identified and thus aid in the determination of the sex. *But the crucial test of sex is dependent upon the nature of the essential glands in the given case.*

When examination fails to determine the sex of the individual, he is commonly classed as a male, as an imperfect male is less likely to enter into the marriage relation than a female. No operation should be attempted for the correction of the anomaly, unless a positive diagnosis of the sex of the individual has been arrived at, and abdominal section may be necessary to ascertain the character of the internal genital organs before such a diagnosis can be made.

Other anomalies of the external genitals are:

Partial or complete absence of the external genitals.

Absence of the vulva.
Double vulva.
Atresia of the urethra, vagina, or anus.
Hypertrophy of the clitoris.
Infantile or undeveloped vulva.
Congenital fistulæ, rectovulvar and rectovaginal.
Cleavage of the clitoris.
Adherent and redundant prepuce.

Few of the above, however, demand detailed description and have little gynecological significance other than for historical interest.

The Vulva.—Congenital absence of the vulva has been recorded. It has been observed in the non-viable fetus associated with other anomalies in development, such as absence of the anus. The parts present an unbroken surface from the symphysis to the coccygeal tip. In one case in which the anus was patent the child lived for some months voiding urine through the umbilicus.

Double Vulva.—There have been three cases of double vulva recorded. It occurs with an imperforate anus and a partial absence of the rectovaginal septum.

Anomalies of the Hymen.—The hymen is a thin, membranous diaphragm partially or wholly occluding the orifice of the vagina between the internal and external genital parts, the orifice of the urethra is usually patent but may present changes in form. The hymen may be absent or rudimentary, or there may be abnormal openings, or anomalies of structure or shape, or it may be *imperforate.*

Imperforate Hymen.—This malformation, which is due to the *persistence of the part of the posterior wall* of the *urogenital sinus* which normally breaks down to produce the vaginal outlet, completely closes the vaginal orifice with a membrane of varying thickness—*atresia hymenales.*

Clinical Course.—The condition is seldom recognized before puberty, when the normal outflow of menstrual blood and mucus secretion is obstructed by the atresia and consequently cannot escape from the vagina. The blood is first dammed back on the vagina, distending it and producing a fluctuating pelvic tumor in the vagina (hematocolpos) appreciable by rectoabdominal touch. This is followed by dilation of the cervix and distension of the uterus by the retained menstrual blood (hematometra). Finally the tubes participate in the dilatation and become blood sacs (hematosalpinx), from hemorrhage, which comes directly from the tubal mucous membrane at each menstrual recurrence. The tumor develops slowly but progressively, gaining size at each monthly period, and may reach a considerable size before the patient submits to an examination. It is fluctuating, fills the pelvic cavity, and may extend into the abdomen to above the umbilicus. The muscular walls of the vagina, uterus and tubes become hypertrophied, and the hymenal membrane is thickened.

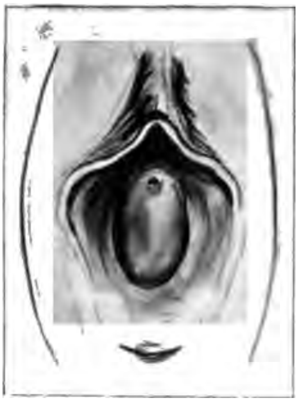


Fig. 9.—Imperforate hymen.

The functions of the bladder and uterus are encroached upon, and frequent urination is a constant symptom. The contained blood looses its fluid character and becomes thick, tenacious and tarry. It is likely, if the condition persists unrecognized, to become infected by the invasion of the colon bacillus and produce a retention sepsis. Or, the over-distension may become so great as to cause rupture of the retaining walls or a leakage from the abdominal ostia of the tubes, and thus set up peritoneal inflammation.

Diagnosis.—The diagnosis is not difficult. The history reveals.

1. That there has been no menstruation, although the girl has arrived at the age of puberty, and suffers from the menstrual molimena, a sense of pelvic fullness, and vesical and rectal irritability, and experiences increased pelvic pain and tenesmus at each recurrent period.

2. Examination reveals no opening into the vagina, and the hymenal membrane may be seen bulging between the labia when the patient strains or bears down.

3. Rectoabdominal palpation demonstrates the presence of an elastic fluctuating tumor filling the vagina and extending above the symphysis.

Treatment.—The treatment is surgical. A crucial incision is made in the hymenal membrane with the cautery knife, and the fluid allowed to escape. The patency of the opening is maintained with a T-shaped rubber tube of large caliber. The strictest aseptic precaution must be observed. No irrigation of the cavity is advised.

A secondary operation is usually necessary after the uterus and vagina have gone through involution. Then the hymen may be excised and the edges of the incision united with sutures. In distensions which produce a large abdominal tumor most authorities advise an exploratory celiotomy to see that no blood has escaped into the peritoneum, before incision is made below. This is unnecessary in most cases.

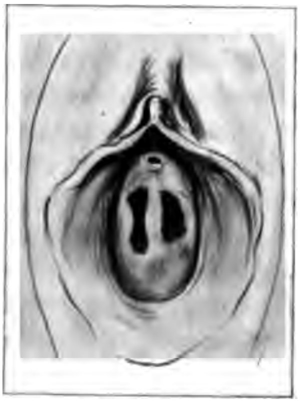


Fig. 10.—Hymen biseptus.

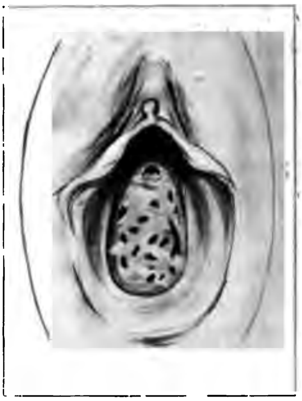


Fig. 11.—Hymen cribriformis.

Abnormal Openings.—*Hymen biforis* or *bifenestratus* has two openings placed side by side; the openings are separated by a wide septum.

Hymen biseptus or *septus* also has two openings lying side by side; the separating septum is narrow (Fig. 10).

Hymen cribriformis is one in which there are a number of openings in the hymenal membrane (Fig. 11).

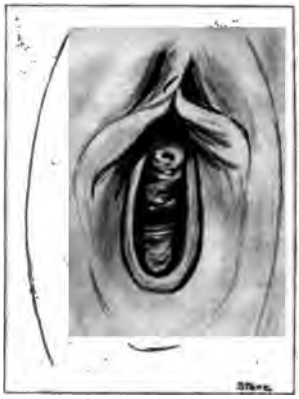


FIG. 12.—A normal distensible hymen.

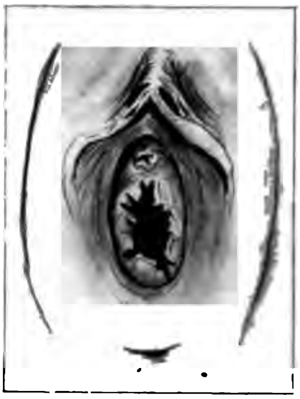


FIG. 13.—The lacerated hymen after coitus.

The structure of the hymen may be so thick and resistant as to prevent the consummation of the marriage relation. Such a hymen is prone to become the seat of inflammatory changes with resulting vaginismus, or the membrane may be so thin, elastic, and yielding, that no injury is sustained at coitus. It is even possible for a full-sized child to be delivered through such an introitus without injury to the hymen.

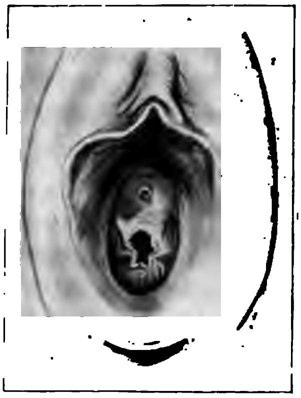


FIG. 14.—The annular hymen.

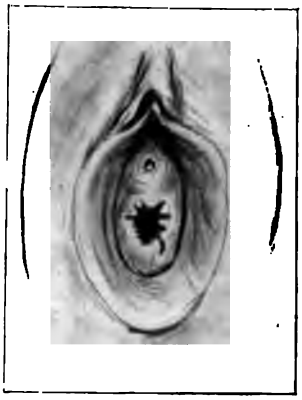


FIG. 15.—Ruptured annular hymen.

The shape of the hymen is various. A normal hymen is crescentic, with its concave margin forward (Fig. 12); or again it may be annular, completely surrounding the entrance of the vagina, with a central opening (Fig. 14); or infundibuliform, presenting a funnel-shaped appearance, its edges projecting inward or denticular, serrated, or sculptured, presenting a fimbriated curved edge (Fig. 16).

The hymen is usually torn during coitus or during the process of parturition, leaving fleshy tabs at the vaginal outlet, which shrink and remain as caruncles (carunculæ myrtiformes), one at the posterior margin and one at each side of the vaginal orifice near the duct of Bartholin's gland, or the hymen may be imperforated when the membrane completely closes the vaginal orifice.

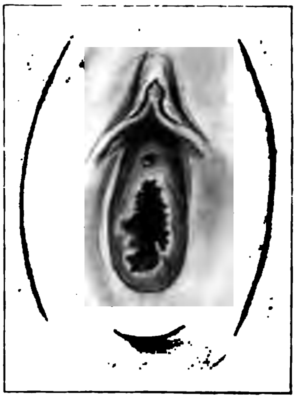


FIG. 16.—Denticular serrated hymen.

Anomalies of the Clitoris.—The clitoris is derived from the genital eminence and as in the male, is an erectile organ.

The clitoris is situated in the median line below the anterior vulvar commissure. It is a small cylindrical body, and is slightly curved, with its convexity outward. It is attached to the pubis by a suspensory ligament. The organ is surmounted by a median tubercle known as the glans clitoridis and the glans is covered by a prepuce formed by the folds of the labia minora. The glans is imperforate and usually but slightly developed.

The clitoris may be *absent* or *atrophied* or *hypertrophied.* The degree of hypertrophy varies. Exceptionally the organ may be as large as a moderate-sized penis, and becomes the source of local irritation. Masturbation tends to develop the clitoris to unusual proportions.

Cleavage of the Clitoris.—In this condition the clitoris is split into two lateral portions. This malformation is usually associated with epispadias, exstrophy of the bladder, and split symphysis.

It needs no treatment, but the associated lesions call for operative reconstruction.

The Prepuce.—The prepuce often presents two abnormalities, *i. e.*, *adhesions* or *redundancy.*

Adherent Prepuce.—Adherent prepuce may cause troublesome irritation of the glans clitoridis and lead to masturbation or obscure reflex nervous symptoms.

The adhesions should be separated with a blunt probe, cocain anesthesia being necessary. The prepuce is then retracted and the glans exposed. The raw surface may be smeared with vaseline to prevent readhesion. The surfaces should be exposed and cleansed and lubricated daily for about two weeks.

Redundant Prepuce.—The prepuce may be abnormally developed, large, flabby, and redundant. It is relatively more developed in children, hence it becomes a source of irritation from the accumulation of smegma between it and the glans. This condition frequently leads to genital irritation and masturbation.

Treatment.—The treatment consists of excision of the redundant skin and the proper approximation of the edges with interrupted sutures.

Labia Minora.—The principal anomalies of the labia minora are hypertrophy and adhesion.

Hypertrophy.—The hypertrophy may be so great as to cause the labia to hang down between the thighs, or to mechanically interfere with sexual intercourse.

Adhesion.—The labia minora may become adherent during fetal life and a superficial vulvar atresia result. The closure is usually incomplete—a small opening is commonly found well anteriorly, through which the urine and menstrual blood escapes. The condition is relieved by passing a grooved director through the small opening behind the adherent lips and cutting through the adhesion. The wound edges are closed with a running catgut suture. It is well for the patient to wear a glass vaginal plug for several weeks, until the severed edges have thoroughly healed.

CHAPTER IV.

DISEASES OF THE VULVA.

VULVITIS.

VULVITUS is an inflammation of the tissues making up the vulva. It may be studied under the following headings:

1. Simple vulvitis.
2. Gonorrheal or specific vulvitis.
3. Follicular vulvitis.
4. Diabetic vulvitis.

Simple Vulvitis.—Simple vulvitis is an inflammation of the vulva which is characterized by free discharge, swelling and heat. It may be either acute or chronic.

Causes.—Simple vulvitis may be caused by uncleanliness, traumatism, chafing or parasites (as the pediculi pubis, seat worms, or saprogenic microbes), or irritating discharges from the uterus, vagina, or bladder, or excessive coitus, or masturbation, or diatheses. It is comparatively rare, and is seen, most often in children and young girls of blonde complexion with delicate epithelial surfaces.

Symptoms.—In the acute non-specific form the patient complains of *local irritation, tenderness*, and *pain and smarting when urinating*, as the urine passes over the inflamed areas. The labia are painful, swollen, red and hot. The discharge is profuse and mucopurulent, and has a fetid odor; the external vulvar surfaces and inner surfaces of the thighs become excoriated and abraided primarily from scratching, due to the existing pruritus, while a dermatitis is likely to follow.

In *chronic vulvitis the itching and burning* are prominent symptoms. The itching may be so severe as to preclude rest. There is usually less swelling. The discharge is thinner and less profuse. However, excoriations due to scratching are constant lesions, and in fat women the inner surfaces of the thighs are often pigmented, inflamed and eroded.

Treatment.—The treatment of simple acute vulvitis may be summarized as follows:

1. Removal of the cause.
2. Physical rest.
3. Frequent cleansing and local medication. The long vulvar hair should be removed with scissors and the external genitals carefully washed with a non-irritating soap, following this, irrigations with warm boric acid solution serve for cleansing. Care must be exercised that none of the solution enters the vagina and forces the infection higher up, as it is always possible that the gonococcus may be a causative factor. Sitz-baths of one-half to one hour duration help to reduce the swelling. They should be taken twice daily, the parts thoroughly dried with absorbent cotton and followed by rest in the recumbent posture.

Sedative lotions like lead and opium or a saturated solution of aluminum acetate applied to the inflamed parts tend to relieve the pain.

Separation of the labia with antiseptic compresses such as lint wet with boric acid solution secures free exit for the secretions and prevents agglutination of the labial edges.

A saline laxative should be taken each night before retiring to secure free action of the *bowels,* while the urine should be rendered bland and non-irritating by the copious ingestion of alkaline waters.

The food likewise should be light and nourishing but without condiment. Coffee and all alcoholic beverages should be prohibited.

Chronic Vulvitis.—The same general rules as to cleanliness and the condition of the urine apply to the treatment of chronic cases. The cause, however, is more easily determined, hence the treatment is less empiric. When the vulvitis is due to parasites, oleate of mercury and mercurial ointment are useful.

Irritating discharges from the vagina, cervix, or uterus should receive appropriate local treatment. Diatheses demand proper local and hygienic attention. Excessive coitus or masturbation should be prohibited. Local measures for the correction of the associated *dermatitis* and *pruritus* are usually required. These consist of thorough cleansing with soap and warm water, irrigations and the application of mild astringents and antiseptics, as weak solutions of permanganate of potash, 1 : 1000 mercuric bichloride, 1 : 10,000 carbolic acid 0.05 per cent, the latter by its anesthetic effect frequently has the most kindly action. Lint compresses wet with an aqueous solution of argyrol should be placed between the labia to keep them separated. As the dermatitis subsides the parts should be *kept dry* and dusted with bland powders; as stearate of zinc, cornstarch, or lycopodium.

Gonorrheal Vulvitis.—This is a specific inflammation of the vulva caused by the gonococcus. It is estimated that about 75 per cent of the cases of vulvitis are of gonorrheal origin. The disease has a marked tendency to spread to the adjacent structures involving the urethra, Skene's ducts, the ducts and the glands of Bartholin; and even to the vagina, cervix and uterus. The lesions and symptoms are usually more severe than are found in the simple type.

Gonorrheal vulvitis may be epidemic in children, the disease running through schools and hospital wards. The presence of the hymen seems to protect the little girl from upward invasion of the gonococcus, although the urethra, Bartholin's and Skene's glands are promptly invaded.

Symptoms.—Within a few days after suspicious coitus or exposure to infection, the vulva becomes irritated and heat, pain, redness and swelling of the vulvar tissues are noted; the pathological changes are more pronounced than in non-specific vulvitis. The urethra rapidly becomes involved and the parts are bathed in a profuse purulent discharge in which the presence of the gonococcus may be determined by the microscope. Gonorrheal infection *generally extends or is carried by the treatment to the internal genital organs.*

The inflammatory reaction is *most severe in virgin tissues* in blondes and in women of the hypothyroid type. The vulvovaginal glands (Bartholin's) and the Skene's tubules just within the meatus are almost always infected in a gonorrheal vulvitis.

No case of acute vulvitis should be classed as gonorrheal, no matter how strong the clinical evidence, *unless the gonococcus can be demonstrated in the discharge by culture or the microscope.*

Treatment.—The treatment of acute gonorrheal vulvitis presents four definite purposes on the part of the attendant.

1. To obtain local cleanliness.
2. To prevent extension of the infection to the other structures.

3. To eradicate the infection by destruction of the gonococcus, and finally to impress on both patient and nurse the contagiousness of the disease and the dangers of accidental infection of eyes, rectum, etc.

A patient suffering from acute gonorrheal vulvitis *should be placed in bed in the Fowler position,* as rest and postural drainage minimize the danger of upward extension. *Care must be exercised that no application or examination be carried past the hymen.*

Separation of the labia with the gloved hand and careful irrigation of the inflamed parts with solutions of normal saline or weak permanganate will remove the purulent discharge. The irrigations should be repeated several times daily; the affected surfaces should then be carefully dried and painted over with a 2 per cent solution of argentic nitrate. This should be allowed to dry. The labia must be kept separated, to allow for free drainage. This is done by placing a pledget of cotton or antiseptic lint saturated with a 20 per cent argyrol solution against the urethra *between the swollen vulvar lips.* After a few days, by following the above directions the physician will be rewarded by seeing the discharge markedly diminished. The bowels may be moved by salines. *Enemata are dangerous in the presence of gonorrheal discharges.* The urine may be rendered bland and non-irritating by the copious imbibition of pure water and milk, and the administration of full doses of urotropin.

The patient should remain in bed while there are pain and bladder irritability, and during and for some days after the menstrual period, as it is during this time that upward extension is most likely to occur.

Gonorrheal Infection of Skene's Urethral Glands.—*Paraurethral Tubules.*—Gonorrheal invasion of the urethral tubules of Skene is the most persistent lesion with which the gynecologist has to deal. The gonococcus may remain indefinitely buried beneath the lining cells of the tubule, or may cause a chain of symptoms referable to the urinary tract as chronic urethritis or cystitis or a persistent infective discharge. Many women marrying for the second time infect their husbands with this discharge, who in turn carry the infection higher up to the cervix and uterus.

Diagnosis.—The diagnosis is made by exposing the mouths of the tubules, by everting the urethra with the finger in the vagina and making pressure against the urethra, from within outward along its course. By this measure a drop of pus may be expressed from the mouth of each tubule which is situated on either side of the floor of the urethra just within the meatus. The *presence or absence of the gonococcus should always be demonstrated in the pus by the microscope before treatment is instituted.* Occasionally the duct may be closed from the inflammatory process when an abscess may form in the tubule. The abscess usually discharges spontaneously *through the tubule.*

Treatment.—Destruction of the gonococcus in this location may be accomplished by (*a*) injection, (*b*) cauterization. After cocainizing the meatus and urethra by inserting into the urethra a pledget of cotton wet with a 10 per cent solution of cocain which is left in place for five or ten minutes, a probe-pointed hypodermic needle is inserted into the duct and a drop of pure carbolic acid, or 25 per cent silver nitrate is injected into the tubule. The treatment may have to be repeated several times at intervals of about a week. More satisfactory is the method of slitting open the ducts with the electric cautery. Under local anesthesia the fine-pointed cautery knife is passed into the duct, the current turned on, and the tubule slit upward into the urethral floor. The tract is then cauterized, destroying the tubule and its contents.

Inflammation and Abscess of Bartholin's Gland.—Inflammation of Bartholin's gland (the vulvovaginal glands) is called *Bartholinitis.* Bilateral involvement is very common in gonorrheal vulvitis. There may be infection of the *duct* alone or of the duct and gland. When of the duct, with a patent tube, the inflammation is about the duct and the orifice of the duct is red and swollen, and a purulent discharge escapes, or the duct may become *choked* or obliterated, or the infection may extend to the gland, and a collection of pus form within the gland itself, distending it and forming an abscess. Abscess of Bartholin's gland may be due to other pyogenic bacteria than the gonococcus.

Symptoms and Physical Signs.—The patient complains of a vulvar swelling with some elevation of temperature. *On inspection* the usual evidences of inflammation are seen. The orifices of the ducts are red and swollen, and there is an ovoid tumor in one or both labia opposite the orifice of the vagina. The overlying tissues are red, hot and painful, and rapidly enlarge. The evidences of acute inflammation differentiate it from a *retention cyst,* which presents less pain and sensitiveness on palpation. It must also be differentiated from a pudendal hernia, vulvar tumors, and retention cysts.

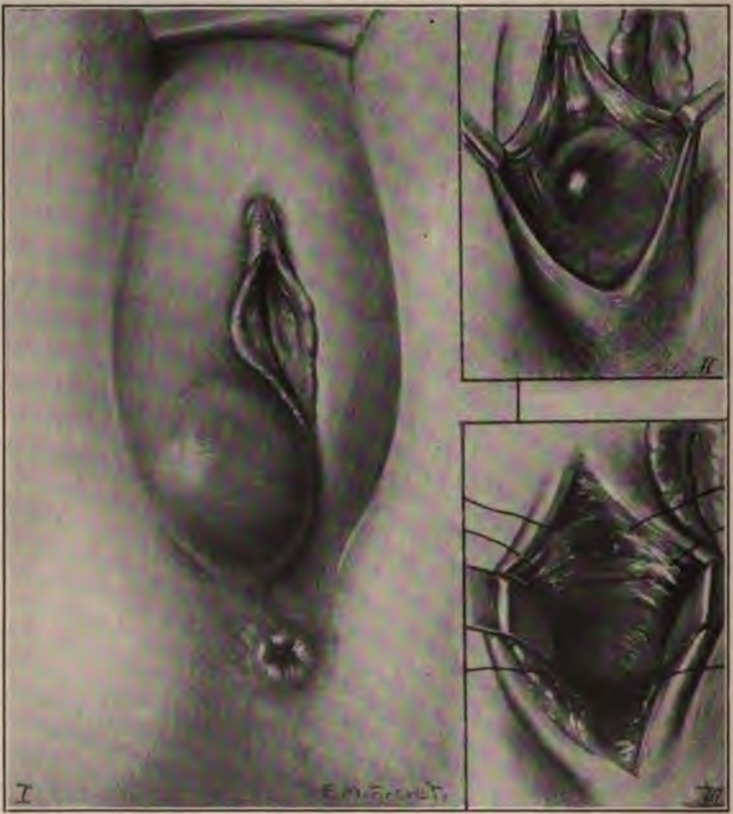


FIG. 17.—Location and appearance of abscess: *I*, cyst of Bartholin's gland; *II*, excision of cyst; *III*, closure of wound with deep sutures.

A hernia presents none of the pain and sensitiveness of a gland infection and usually one or more of the usual signs of hernia are demonstrable in the tumor, *i. e.*, an impulse on coughing, reducibility in the recumbent position, evidence of intestinal obstruction, or resonance on percussion.

A retention cyst of the vulvovaginal gland has none of the inflammatory symptoms characteristic of an abscess. The swelling is ovoid and not painful, and the overlying skin may be moved freely over it. Aspiration of the contained fluid will always make the diagnosis positive.

Treatment.—It may be possible to dilate the duct with a probe and allow the contained purulent fluid to escape. A blunt-pointed hypodermic needle attached to a syringe containing a dram of a 20 per cent argyrol solution is then passed through the duct and the argyrol injected into the gland cavity. This may be repeated daily. This treatment is painful and the result is not as satisfactory or permanent as incision or excision.

Incision.—The tissues about the tumor should be infiltrated with a 0.05 per cent solution of novocain. When the local anesthesia is complete, the abscess may be emptied by a free incision over the gland at the junction of the skin and mucous membrane. *Extirpation or destruction of the gland is necessary to prevent recurrence.* This may be done with a sharp curette, or by the application of pure carbolic acid to the abscess cavity, followed by a firm gauze pack which may be left *in situ* for several days. In the author's hands nitrous oxide and oxygen anesthesia is preferable to local infiltration.

Excision of the gland is applicable alike to abscess or cyst, and when done properly has many advantages over incision, as it insures extirpation of the entire gland. Under general or local anesthesia, the abscess or cyst may be emptied of its contents through an aspirating needle; then without withdrawing the needle the cavity is injected with melted paraffine wax, which promptly solidifies within the limits of the gland. The entire mass may then be enucleated by blunt dissection. The wound is closed with deep sutures, providing drainage by the insertion of a strip of rubber tissue.

Follicular Vulvitis.—Follicular vulvitis is characterized by an inflammation of the hair follicles and sebaceous glands about the vulva. Small red papules are found scattered over the labia. These become pustules, *with a hair in the apex of each.* The surrounding tissues are more or less inflamed from the confluence of the lesions.

Irritating discharges, lack of cleanliness, parasites, and local irritation are the chief predisposing causes. The Staphylococcus albus is the direct cause of the pustule formation. Occasionally the condition occurs during pregnancy.

Symptoms.—The symptoms are the same as have already been described under simple vulvitis.

Treatment.—The vulvar hair should be clipped, and the vulvar surfaces carefully cleansed with soap and water, rinsed with warm water and dried. The hair in each pustule may be extracted with suitable forceps, and compresses saturated with alcohol (50 per cent) and boric acid solution applied. Greater effect may be obtained by covering the compresses with rubber tissue, held in place with a T-bandage. The compresses should be changed frequently. Rest in bed contributes to a speedy recovery. Obstinate cases often yield kindly to vaccine therapy. When the pustules are few in number, after the hairs have been removed from each pustule, it may be painted with the tincture of iodine, which is allowed to dry, and the vulvar surfaces left uncovered.

Diabetic Vulvitis.—Diabetic vulvitis is caused by the decomposition of diabetic (sugar-loaded) urine passing over the vulvar surfaces. It is characterized by a reddish copper color of the tissues of the vulva and inner surfaces of the thighs. The skin is parchment-like. The itching is constant, and there may be local pain and tenderness. Eczematous changes may take place in the skin. The patient is generally in poor health not only from the diabetes but from her disturbed rest.

Diagnosis.—The diagnosis is made on the clinical picture and the presence of the glycosuria.

Treatment.—The treatment is both general and local. The general management consists in a regulated diet and the administration of large doses of bicarbonate of soda. Locally the pruritus may be relieved by ointments or dusting powders, after the parts have been carefully cleansed with soap and warm water. An ointment such as the following, applied after thorough cleansing of the parts, has given much relief.

℞	Acidi salicylas	gr. x.
	Unguentum petrolatum	℥j.

A protective skin of the following may be applied:

℞	Zinci sterate	ʒiss
	Acidi carbolici	gr. v
	Glycerini	ʒiss
	Pulv. tragacan	gr. xij
	Aquæ	℥j

Kraurosis Vulvæ—Atrophy of the Vulva.—Kraurosis is a rare disease of the vulva, which is characterized by atrophy and shrinking of the skin and obliteration of the normal folds—*a shrinkage of the vulva* due to atrophic changes in the cutaneous covering, especially of the inner surfaces of the labia minora, which may even entirely disappear. The skin becomes sclerotic. The tissues lose their elasticity and tear easily. According to Jung, it is the final stage of vulvitis. It may effect one or both sides, and may occur at any age after puberty, but it usually occurs in women near or past the menopause. The essential cause is not known, although it is believed that the cessation of the ovarian secretion plays an important part in the causation.

Symptoms.—A sense of heat and itching about the vulva, pain in paroxysms, and marked sensitiveness are the chief subjective symptoms. The introitus is contracted; the tissues surrounding it become white and dry and studded with brown spots of varying size. The skin is tense and shrivelled as by scar tissue, with a marked tendency to shrink and fissure. The glandular structures are obliterated by pressure atrophy, and only sclerotic skin remains. The sensitive spots and extreme narrowing of the vaginal orifice makes coitus painful or impossible. Painful fissures form in the brittle skin about the commissure and add to the patient's discomfort.

Treatment.—The treatment is palliative and radical. To relieve the burning pain and pruritus hot wet compresses of sedative lotions give temporary relief. Inunctions of the yellow oxide of mercury grain-x to the ʒj of unguentum petrolatum, used twice daily has given some comfort. Decided benefit has resulted from the internal administration of ovarian extract in 5-grain doses three times a day. In some cases actual changes in the local appearance and condition of the tissue have taken place. The roentgen ray is recommended by foreign authorities and has sometimes proved effectual. Usually, however, excision of the diseased tissues is necessary. The sclerotic area is excised and the lower end of the vagina is dissected free from its attachments and is stitched to the edges of the cutaneous incision. A glass vaginal plug should be worn for some time after operation, to prevent contraction of the introitus.

Leukoplakic Vulvitis.—Leukoplakic vulvitis is a chronic inflammatory condition of the vulva of unknown origin, characterized by white patches on the surface; in its early stages there is marked hyperemia and cell activity. Later there is marked epithelial hypertrophy and a thickened sclerosed and retracted condition of the subepithelial tissue.

The cause is unknown, though the disease generally appears at or after the menopause.

Symptoms and Signs.—The most prominent and early symptom is pruritus. Later, owing to the exposure of the nerve endings in the floor of the ulcer or crack, there is pain; while in the final state, when retraction of tissues take place, there are no symptoms. The vestibule and the orifice of the urethra are never molested but any other part of the vulva may be the seat of the disease. At first the parts are red, swollen, excoriated and dry, then the labia minora retract and thicken and the color, as does that of the labia majora, becomes white. This is followed by cracks and fissures in the skin, or ulcers may appear. A slight sero-bloody discharge comes from these cracks and ulcers and carcinoma may become ingrafted on the ulcer. Leukoplakic vulvitis is an antecedent and cause of carcinoma of the vulva. This clinical fact makes excision of the involved area the only logical procedure.

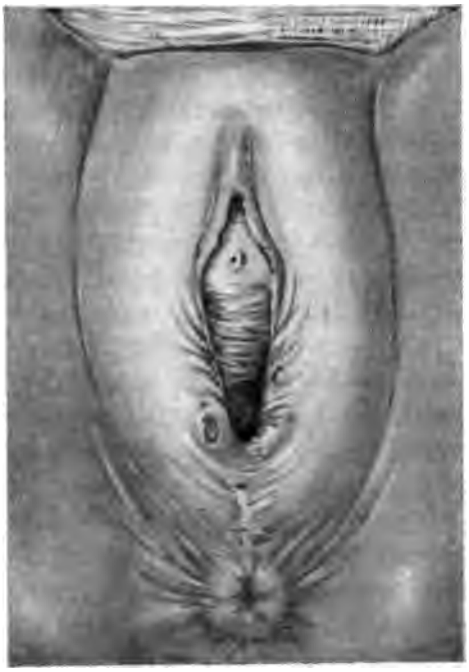
Eczema of the Vulva.—Eczema of the vulva is a non-contagious inflammatory affection of the skin occurring about the labia majora. It appears as an erythema with papules and vesicles. The vesicles break and a watery discharge escapes which drys and forms crusts and scales, producing an itching discharging surface with infiltration of the underlying and surrounding skin. The eczematous changes may be confined to the vulva or may extend to the inner surfaces of the thighs or into the vagina.

Cause.—The predisposing causes are the same as predispose to eczema in other locations. These are generally found in nutritive disturbances associated with gastro-intestinal disorders, or in the diatheses such as rheumatism or gout.

The atrophic changes, which occur at the menopause, seem to produce such local nutritive disturbances in the vulva tissue that local irritation, as acid discharges and diabetic urine, excite eczematous changes in the skin.

Symptoms.—The symptoms are very distressing and oftentimes extremely embarrassing for the patient owing to the severe itching

PLATE III



Leukoplakia showing Ulcer Simulating Cancer of Vulva.

induced. The symptoms are chiefly itching, burning and a watery discharge from the skin about the vulva region. The skin becomes infiltrated, indurated and excoriated.

The diagnosis is made on the same characteristics as are found in eczema in other parts of the body.

Treatment.—The treatment does not materially differ from the management of eczema in other locations. The indications are: (1) to allay the local irritation; (2) to correct the nutritive disturbances which are the underlying cause. The parts should be thoroughly cleansed with green soap and warm water. The scales are removed with a solution peroxide of hydrogen diluted with one-third of soda bicarbonate solution. The skin is then carefully dried. When this has been done sedative lotions as calamine and zinc, or lead and opium, may be applied to relieve the itching.

Sedative Lotion

℞—Lig. plumbi subacitat	ʒj
Tinct. opii	ʒij
Aquæ	℥viij

Sedative Paste

℞—Zinc oxide	gr. x
Calamine	gr. x
Glycerin	℥ij

The urine should always be examined for sugar and all acrid vaginal discharges must be corrected.

After the surfaces have been cleansed and the acute pain relieved with sedative applications; painting the affected surfaces daily with one-half strength tincture of iodine and allowing it to dry, stops the itching and promotes healing. A spice-free vegetable diet together with the ingestion of large quantities of milk to which half a dram of soda bicarbonate is added to each eight ounces, does much toward improving the local condition. In the chronic cases after the skin has been thoroughly cleansed the scales are removed. Ointments seem to have a more kindly action than lotions. Diachylon ointment (equal parts of emplastrum plumbi and vaseline melted together) may be applied freely over the affected parts and covered with strips of moist lint. Great care must be used to protect the surfaces from moisture. No water should be applied for several days. Then the parts may again be thoroughly cleansed with green soap and water, dried and the application of the ointment repeated. The success of the treatment depends largely upon the attention to detail, cleanliness and surface protection.

Herpes of the Vulva.—Herpes progenitalis consists of the formation of groups of small vesicles with an inflamed base. The vesicles do not rupture easily. Herpes occurs in nervous or fat women with delicate skin, near the menstrual epoch, and occasionally during pregnancy.

Symptoms.—The symptoms are seldom pronounced, though irritation from itching and local tenderness may be complained of.

Treatment.—The treatment is local and consists of cleanliness and the use of sedative dusting powders, as bismuth subcarbonate with magnesium carbonate. To this may be added cocain hydrochlorate in the proportion of a grain to the ounce (gr. j to ℥j), should pruritus persist.

PRURITUS VULVÆ.

Pruritus vulvæ or itching about the vulva is really a symptom of many vulvar affections, yet its severity warrants its consideration as a *vulvar condition*—a *distinct entity,* especially at or near the menopause when few skin lesions can be demonstrated.

Pruritus vulvæ comes on in paroxysms, often most intense at night. The itching may be confined to the clitoris, labia or vestibule, or extend to the anus, vagina, abdomen and thighs. It may disappear and the patient be in comparative comfort for hours or even days, and then return with all its intensity of symptoms. The itching is aggravated by exercise, the warmth of the bed, sexual intercourse, after the menstrual period, and during pregnancy. The constant suffering robs the patient of her proper rest and makes her nervous and irritable.

Causes.—The local atrophic changes common to the menopause predispose to pruritus. A large proportion of the most aggravated cases occur at or near the climacteric. Neurosis is a predisposing cause.

Uncleanliness, irritating vaginal discharge, parasitic and zymotic causes, diabetic urine, local skin diseases such as eczema and intertrigo, and disease of the uterus or adenexa or pregnancy, producing pelvic congestion, and gouty diatheses all act as exciting causes. The waste products of faulty metabolism have an irritating effect on the mucous surfaces of the vagina and vulva.

Treatment.—The treatment may be divided under the following headings:

1. Cleanliness and the removal of the local cause of irritation.
2. General tonic and hygienic measures, including the treatment of gouty diatheses or diabetes.
3. Local sedative applications (antipruritic).
4. Roentgen-ray therapy.
5. Excision of the affected skin area.

Under the first head may be included the relief of irritating vaginal discharges by alkaline douches and vaginal tamponade with glyceride preparations, as boroglyceride, icthyolate of glycerin, or the glyceride of tannin; or the recognition and cure of pediculosis pubis, by finding the parasites attached to the pubic hairs, and their extermination with the oleate of mercury as an inunction rubbed into the hairy region of the pubis.

General measures should include the employment of saline laxatives, tonics, and nerve sedatives, as the bromides and valerian, and the correction of digestion by regulation of diet, and the administration of antiputrefactives. Sleeping alone in a cool room does much toward adding to the patient's comfort. Among the local sedatives and curative measures may be mentioned the application of lint wet with carbolic lotions to the affected parts, as:

℞—Carbolic acid	ʒv
Glycerin	ʒiij
To the quart of lime water.	

Or painting the irritated areas with solutions of silver nitrate of 5 to 10 per cent strength, or with pure ichthyol. Occasionally the itching may be relieved by sedative powders, as bismuth subcarbonate, with morphine and chalk or stearate of zinc.

In the severe types the application once a week of 50 per cent carbolic acid over the skin surfaces—which is neutralized in a few seconds with alcohol—has given prompt relief. Rest in the recumbent position is imperative after this application. The roentgen rays have occasionally been beneficial in giving temporary comfort. Two or three exposures are usually necessary. In refractory cases associated with kraurosis, excision of the affected skin under a general anesthetic has been recommended. Others advise section of the internal pudic nerve.

VAGINISMUS.

Synonym.—Hyperesthesia of the vaginal entrance.

Vaginismus is a painful spasmodic contraction of the constrictor vaginæ and anterior fibers of the levatores ani muscles induced by irritation, such as attempted coitus, or the introduction of the finger or instruments within the vaginal orifice.

Causes.—This hyperesthesia occurs most frequently in nervous young women, newly married, or in women near the climacteric. The cases fall into two classes: (1) Cases in which an apparent cause cannot be discovered; (2) cases in which a definite cause is ascertained.

Under the first head the vaginismus is usually the local manifestation of a neurosis and is associated with extreme hyperesthesia of the vulva mucous membrane. While in the second class the spasm of the introitus may be due to or be a symptom of a urethral caruncle, or inflammation of a rigid hymen or the remnant of the hymen, or of neuromata developed on the remnants of the hymen, or a rectal or vaginal fissure, or a fissure of the vesical neck.

Occasionally hysteria will prevent the consummation of the sexual act.

Symptoms.—No symptoms call attention to the condition until marriage when the patient will usually seek medical advice complaining of dyspareunia or of sterility. Examination will reveal the contraction of the vaginal orifice. The pain and spasm is induced on touching the mucous membrane of the vulva. The thighs are strongly adducted and approach becomes impossible. Examination under an anesthetic is advisable, for only in this way can the local lesion inducing the spasm be recognized. It must always be remembered that the spasm of the introitus is often only a symptom of urethral caruncle, irritable fourchette, rectal or vaginal fissure, or fissure of the vesical neck.

Treatment.—The treatment includes removal of the cause and divulsion or gradual dilation of the vaginal orifice. The general nervous irritability may be reduced by sedatives and proper hygiene. An irritable hymen or neuromata formed in the remnants of the hymen should be excised by partial or complete excision. This is best done under a general anesthetic, which at the same time allows of gradual but complete dilation of the vaginal orifice.

The dilation should be maintained by the introduction into the vagina of a large glass plug, which may be worn for several months.

Extirpation of a urethral caruncle will frequently relieve the spasm of the vaginal muscles, as may also the incision of an anal fissure. After the local causes have been corrected, anesthetic ointments, as cocain or orthoform, help to lubricate the parts and make coitus less painful.

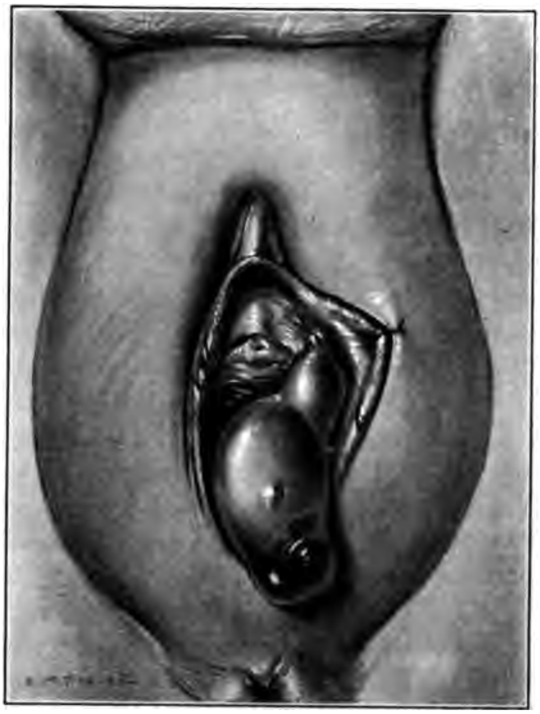


FIG. 18.—Pedunculated fibroma of the vulva.

NEW GROWTHS OF THE VULVA.

Fibroma of the Vulva.—Fibromata of the vulva are rare and are usually found on the labia majora. These tumors occur in the connective tissue of the vulva and have the same his structure as fibromata elsewhere. Some few are fibro which evidently take their origin from the muscle fibe round ligament.

Symptoms.—Unless the tumor ulcerates, at which time will complain of pain, discharge and bleeding, the sym fibroma of the vulva are purely those of mechanical ob

Signs.—These solid tumors are generally small or p and hard. They vary in size from that of a pigeon's e a child's head and are painless to manipulation unl inflamed. Mucoid degeneration may take place with of the tumor. Should this occur the growth becomes in size, and has the physical signs of a vaginal cyst, frequently mistaken.

Treatment.—The treatment is removal. In pedu the pedicle should be divided and the bloodvessel sup ligated. When the tumor is sessile the growth ca through an incision made over the tumor at th margin, the bleeding vessels tied, and the wo sutures, leaving a small drain in the lower angle

Lipoma.—Fatty tumors may be very rarely f majora or in the mons veneris. Their histol similar to that of lipomata in other parts of the b

Symptoms.—Such tumors, as a rule, are small any inconvenience unless they become ulcera these fatty growths in this situation attain they may be the cause of dyspareunia or int These tumors have been reported as having delivery of the child through the vulva orifice.

Signs.—Lipomata may be pedunculated or s able, their consistence varies somewhat, but fibromata and the skin over them is not s times they may be mistaken for cysts.

A fatty tumor with a sessile base may ex canal and simulate a hernia, but it is easi absence of the classical signs of hernia nam and the irreducibility of the swelling.

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may be ulcerated or have a warty appearance. The affection is commonest in tropical countries.

Diagnosis.—The diagnosis is made on the general character of the enlargement and induration of the contiguous skin. There is usually present more or less chronic ulceration in the folds, under the growth. It is differentiated from carcinoma, papilloma, sarcoma and lipoma by their histological characters and from lupus or tubercular enlargement by microscopical examination for tubercle bacilli, and by animal inoculation.

Treatment.—Attention should first be given to the management of the ulcerations and dermatitis about the base of the tumor. After this has been satisfactorily healed, the hypertrophic structures should be excised. In pedunculated growths excision with the cautery, even in the presence of ulceration, may be practised; usually however, the knife is preferable.

Papillomata or Condylomata are found about the vulva in three forms:

The pointed condyloma or moist wart occurring singly or in groups, scattered or massed about the vulva, the vestibule, perineum or anus, usually associated with gonorrheal infection.

The flat condyloma or condylomata lata, one of the secondary lesions of syphilis; and *the common wart, or verruca vulgaria*, a non-specific condyloma, dry, pigmentated, and elevated, usually found as discrete growths on the labia or mons veneris.

Pathology and Diagnosis.—Pointed warts are hypertrophied papillæ of the skin or mucous membrane, having a connective tissue base covered with many layers of squamous epithelium. They may extend into the vagina, and occur singly or in masses. When they are grouped together in masses, the secretion may become confined under the growths, decompose and extend the areas of irritation and produce a most offensive odor. *The discharge can transmit the disease.*

The flat warts are syphilitic and are more apt to occur singly or in discrete groups. They consist of a slightly elevated, flattened area, from which part of the epithelial covering has been thrown off, giving a circular or elliptical outline. They are usually found on the labia minora and on the inner surface of the labia majora. The secretion is less than in the pointed form of growth; hence the condition is less offensive, though there is always some moisture from the vaginal discharges. Usually the inguinal glands are found enlarged but not tender.

Treatment.—The treatment depends on the variety of the wart. *Common warts* may be removed by excision, the curette, the actual cautery, or the chemical cautery. Nitrate of silver, nitric acid, and a salicylic acid are the usual cauterants used.

The procedure may be made painless by injecting a few drops of cocain beneath the base of the wart.

Gonorrheal or pointed warts may be treated with cleansing vaginal irrigations of weak antiseptic solutions, as 1 : 5000 bichloride used several times daily. This should be followed by carefully drying the condylomatous mass and freely dusting it with an antiseptic drying powder, as calomel and bismuth subcarbonate or calomel and salicylic acid equal parts. Should this treatment fail, excision of the masses with a fine cautery knife and cauterization of the base of the growth will accomplish the desired cure. A general anesthetic is necessary to remove the growth thoroughly.

Flat warts need local cleanliness, which is obtained by antiseptic irrigations. After each irrigation the masses must be carefully dried and calomel freely dusted over the surface. Internally the routine constitutional treatment for secondary syphilis will be required.

Carcinoma and Epithelioma of the Vulva.—Malignant disease of the vulva is comparatively rare.

Epitheliomatous growths do occur, and usually begin as a small, hard nodule with a bluish tinge near the mucocutaneous junction located on the lower portion of the labium majus. Even before the growth shows evidence of enlarging the patient may complain of an *intense burning sensation* referred to the region of the growth. The nodule grows slowly, and at first may produce no symptoms. In some cases, however, from the first there is a severe pruritus out of all proportion to the appearance of the growth. After a time part of the nodule breaks down forming a small ulcer which is surrounded by tissue infiltration. From this ulcer there is a watery discharge which is sometimes mixed with blood, and the patient continues to complain of intense pruritis. The tissue is friable and the serosanguineous secretion is usually putrid. The inguinal glands are involved early, are enlarged and insensitive. Later the infection spreads and the glands become swollen and painful. The growth may spread along the labium to the urethra and clitoris or produce another ulcer at the point of contact with the opposite labium. When the epithelioma occurs at the meatus, it causes the urethra to have the appearance of a formed indurated cylinder. The condition has to be differentiated from lupus (tuberculosis) and syphilis. Besides the common location for carcinoma of the vulva, which is usually *on the posterior margin of the labia majora,* it may also be found to involve the clitoris, or the Bartholin's glands or ducts.

In lupus usually the glands are not involved, the serosanguineous secretion is absent or slight, and it is not foul. Histological examination of a section of the growth is the crucial test.

Burning pain in the region of the vulva associated with any lump or ulcer, usually out of proportion to the involvement in a woman of forty or over should always be looked upon with suspicion. It should be remembered that burning pain is the earliest symptom of this condition. Later the pain is due to deep seated involvement.

Syphilis may be distinguished by the usual clinical manifestations, the Wassermann reaction, and the therapeutic test. Here again the pathologist's report should be sought early.

Treatment.—Unless the disease is recognized very early radical cure is hopeless, as the lymphatic supply is so abundant. The author has never seen a patient recover in whom ulceration had already taken place.

Early and wide excision of the labia and the inguinal glands of both sides should be promptly undertaken on establishing even a presumptive diagnosis.

In the inoperable cases the indications are to relieve the pain and keep the ulcerated surfaces clean and free from odor. The roentgen ray and radium may control the former, though opium is generally necessary.

Bland alkaline irrigations or weak formalin solutions cleanse the surfaces and help to allay the burning. Charcoal (℥j) and bismuth (℥ss) to which ʒj of orthoform is added may be used freely as a dusting powder on the ulcer.

Urethral Caruncle.—Urethral caruncle is a fairly frequent condition at the urethral orifice. It appears as a bright red fragile tumor, an angiomatous growth of raspberry-like appearance at or just within the meatus urethræ, usually at its lower margin, projecting from the orifice. It is seldom larger than a pea. Microscopical section shows it to be a simple papilloma, composed of dilated capillaries supported by a small amount of connective tissue, and covered by several layers of flat or transitional epithelium. It is amply supplied with nerves.

Symptoms.—It may occur at any age, although it is more commonly seen in the woman at or past the menopause. It is excessively sensitive, causing exquisite pain during micturition. It is irritated by walking, and may produce dyspareunia. It bleeds easily and is likely to excite vesical irritability. It has to be differentiated from urethral prolapse and urethral polyp. In the former, the protrusion is annular and can be reduced. A polyp is usually pedunculated and is less sensitive.

Treatment.—A urethral caruncle tends to recur after removal. The growth may be destroyed by the actual cautery or fulguration. The urethra is cocainized by placing a pledget of cotton saturated with a 10 per cent solution of cocain within the meatus. When the tissues are fully anesthetized, a fine galvano-cautery knife is pushed into the growth and the entire tumor destroyed. Unfortunately, this treatment leaves a granulating surface on the floor of the urethra, which is slow to heal. This is not so in the fulgurated growth. Excision under cocain or general anesthesia is the most satisfactory treatment. The excision should be carried well beyond the limits of the growth; the mucous membrane of the vestibule is then stitched to that of the urethra with interrupted sutures of fine catgut. The operation should be preceded by dilation of the meatus to expose the area for excision.

Labial Hydrocele.—Hydrocele of the labium majus, or "labial hydrocele," is a rare condition producing a labial swelling, due to a dropsical effusion into the canal of Nuck, the inner end is closed and forms the sac. It occupies a location similar to an inguinal hernia, but presents many distinguishing characteristics, in that it is less sensitive than a hernial protrusion, and there is no impulse on coughing. It usually cannot be reduced, though it may disappear on lying down. It is dull on percussion, translucent and fluctuant. Its growth is gradual and though irreducible, presents no signs of intestinal obstruction.

Treatment.—The treatment consists of *injection, incision,* or *excision.*

By injection the contained fluid is drawn off through a small aspirating needle, and without withdrawing the needle a syringe containing 30 minims of pure carbolic acid is attached and the phenol injected into the sac. The danger from injection comes from a possible mistake in diagnosis, for the injection of carbolic acid into a hernia would give disastrous results.

Free incision of the tumor, after first exposing the sac and then firmly packing the cavity with iodoform gauze, is a simple and efficient method in many cases.

Extirpation of the sac produces a radical cure. The procedure is as in a Bassini operation. The sac is exposed and dissected free to the inguinal ring, where the stump is tied and cut off close to the canal and the wound closed with sutures.

Pudendal Hernia.—Pudendal hernia is a protrusion of the intestine or omentum through the canal of Nuck and descends into the labium magnus, when it becomes an inguinolabial hernia. Rarely it may contain the ovary and tube, or even the uterus. It seldom becomes strangulated.

A hernia has to be differentiated from other vulvar swellings, *i. e.,* a hydrocele, cyst, abscess, fibroma, etc.

The history of the mode of its formation has a suggestive diagnostic significance in differentiating the several vulvar swellings.

A hernia usually appears in conjunction with some straining effort, and disappears on the patient assuming the recumbent position. A hematoma generally follows a history of varicosities or of some external injury; while cysts, hydrocele and tumors, are of a gradual development.

A hernia of the intestine gives an impulse on coughing, resonance on percussion, and is usually reducible.

A hernia of the ovary is distinguished by its size, shape and peculiar sensitiveness. A hernia of the uterus is recognized by its size and shape, and by the absence of the uterus from the pelvic cavity.

Treatment.—When the hernia is reducible and there is no superficial inflammatory change about the pudendal region, a truss may retain it. Usually the radical operation is demanded.

Varix of the Vulva.—Varicose veins of the vulva are usually dependent upon pregnancy, an obstructing pelvic tumor, chronic constipation, or visceral disease which interferes with the venous return. The condition is generally unilateral. When bilateral it is usual for the varicosities to be larger on one side than on the other. Enlargement of the left labium is the more common.

Varicosities are seldom found in young women, while the condition is frequent in women who have had repeated pregnancies. The mass, which is increased by standing, may reach the size of a cocoanut. *Rectal varicosities frequently coexist.*

The mass is liable to rupture spontaneously or by traumatism, especially during labor. The rupture may occur subcutaneously with a resulting hematoma which may reach enormous proportions, or externally with hemorrhage. The bleeding may be so excessive as to cause death.

Diagnosis.—The diagnosis is self-evident. The patient may complain of pain and a feeling of fullness or tumefaction in the vulva region on assuming an erect position, and on inspection the veins of the vulva are seen to be irregularly dilated. The enlargement is always increased by the patient standing.

Treatment.—The treatment consists in relieving the intra-abdominal pressure causing the venous obstruction; *as this is frequently due to pregnancy or pelvic tumors,* the condition is likely to persist until the termination of the gestation or the removal of the tumor. However, rest in bed in the elevated foot posture with supporting pressure made with a gauze pad and a T-bandage may give temporary relief and prevent further dilatation. In the non-pregnant state enlarged veins of the vulva may be exposed, ligated and excised, as is done in varicosities in other parts. In case of rupture the mass may be ligated with sutures and the hemorrhage controlled at its source.

Hematoma of the Vulva.—Hematoma of the vulva is a tumor of the vulva containing effused blood, usually resulting from the rupture of a varix; the loose subcutaneous tissues of the genitals present little resistance and allow of great distention from subcutaneous bleeding. Hematoma occurs most frequently in pregnancy and labor, and may result from spontaneous rupture of a varix or external injuries; as a fall, kick or puncture, injuring one or more of the vulvar veins.

Symptoms.—As a rule the *vulvar tumor appears suddenly*, following some injury, and is accompanied by *severe local pain*, owing to the rapid distension of the connective tissues, and the patient complains of fullness and pain in one labium, with more or less rectal and vesical tenesmus. It has to be distinguished from hernia, abscess, hydrocele, etc.

The tumor is usually situated in one of the labia majora, and has the following distinguishing characteristics: It is *globular in shape, elastic in consistency, purple in color, and tender to the touch; while ecchymosis may be observed in the adjacent tissues.* The tumor may undergo the following changes: It may become absorbed or encapsulated, or it may become infected and suppurate. It is a grave complication in labor, as it may cause mechanical interference at the outlet, or rupture and endanger the woman's life from hemorrhage.

Treatment.—The patient should be in bed in the elevated hip-posture, with the thighs abducted and an ice-bag over the swelling, making support and controlling its increase in size. Large or septic hematomas should be incised, the contained clots turned out, the cavity irrigated, dried out, and firmly packed with gauze.

Venereal Ulcers of the Vulva.—Venereal sores appearing on the vulva are chancroids, chancres, and the syphilides.

Chancroids.—A chancroid is a soft, non-syphilitic venereal sore which, in from forty-eight to ninety-six hours after sexual intercourse, begins as a small infectious ulcer on the mucous surface of the external genitals. Chancroids are of rapid development and are usually multiple, due to the purulent autoinoculable secretion.

The ulcer rapidly enlarges, is highly inflamed and painful; the base is rough, necrotic, non-indurated, and secretes a profuse purulent discharge. It is surrounded by a red, edematous, inflammatory zone. The virus may be carried by the lymphatics to the inguinal glands, but seldom involves more than one gland at a time, producing the "chancroidal bubo," which suppurates. The diagnosis is made on the following points:

1. The period of incubation—the sore appears within a few days after suspicious coitus.

2. Begins as a small ulcer in the mucous surface, which rapidly enlarges with extensive tissue destruction.
3. The lesions are usually multiple from the inoculability of the purulent secretion.
4. The base is not indurated, but is surrounded by a zone of inflammatory edema.
5. If a bubo forms it usually suppurates.
6. Bacterological examination of the tissue shows the presence of the Ducrey bacillus.

Treatment.—Treatment should consist of rest in bed, with thorough cauterization of the chancroid to destroy the virus. After carefully cleansing the ulcer, it is covered with a pledget of absorbent cotton wet with a 20 per cent solution of cocain, which should be left in place for five minutes. When the parts are thoroughly anesthetized, the surface of the ulcer is cauterized with pure carbolic acid. Any extension of the cauterization to the surrounding skin is neutralized with alcohol. Following the cauterization the ulcer should be kept clean with some antiseptic, as a weak (0.5 per cent) carbolic wash and some soothing ointment applied. Cleanliness is the keynote of success. When its destructive tendencies are controlled and extension checked, dusting powders, as iodoform and aristol hasten the healing.

Chancre.—A chancre is the initial lesion of syphilis. It appears as a small red papule commonly found on the mucous surface of the labia majora, the nymphæ, or at the fourchette. The papule may be elevated and pointed or flat and not raised above the surface of an indurated base.

The induration gradually increases. It is either parchment-like or nodular. The primary lesion occurs from three to eight weeks after the infection has taken place, through some abrasion in the skin or mucous surface. The chancre is usually single, and is not autoinoculable like the chancroid. The discharge is serous and the presence of the spirochete makes the diagnosis positive.

The inguinal glands become enlarged, but do not tend to suppurate. Other manifestations of syphilis as mucous patches, or tertiary ulcers, may appear on the vulvar surface. The blood Wassermann confirms the diagnosis. The reader is referred to the larger works on syphilis for the treatment of these conditions.

Tuberculosis of the Vulva.—Tuberculosis of the vulva begins as a small nodule of dusky red or bluish color, situated under the meatus, clitoris, or at the posterior commissure. The nodules break down to form ulcers with hard margins and an irregular base with indefinite areas of infiltration about them. Tubercular ulcers tend to coalesce and form extensive areas of ulceration with irregular outline. The secretion from the ulcer is seropurulent and may or may not contain the tubercle bacillus. Tubercular ulcers are chronic, and may extend deeper and deeper into the tissues, healing at one part while further invasion is going on in another.

Diagnosis.—The diagnosis is made on the character of the ulcer, its chronicity, the demonstration of the tubercle bacillus in the discharge, and microscopical examination of the tissue changes in the sections removed from the margin of the ulcer.

Treatment.—If the lesion is primary, the entire infiltrated area may be excised and the wound closed by sutures, or if the involvement is too extensive for excision the ulcer may be curretted and then cauterized with the thermocautery or pure carbolic acid. The roentgen rays and the Finsen light have a decided curative value in skin tuberculosis and superficial ulcers.

Other growths of the vulva are enchondroma, cysts of the sebaceous glands, and occasional dermoids; their rarity justifies an omission of their description.

COCCYGODYNIA.

Coccygodynia is a painful affection due generally to some injury of the coccyx or its ligaments. Angulation of the coccyx from fracture or ankylosis is a common lesion. Sometimes necrosis takes place in the bone.

Causes.—The causes are parturition from the use of forceps in funnel pelves, or falls or blows upon the coccyx.

Symptoms and Signs.—The symptoms and signs are pain which is referred to the very end of the spine, which may radiate into the pelvis or down the thigh. The pain is aggravated by any change of position which occasions movement of the bone. On palpation of the coccyx with the index finger in the rectum and the thumb on the skin over the bone, exquisite pain may be elicited by forcible flexion and angulation, fracture or ankylosis may be noted. The marked tenderness is limited to the coccyx and its ligaments.

Treatment.—Before instituting treatment it is necessary to ascertain by digital examination the amount of pathology which has actually taken place in the bone or in the sacrococcygeal joint. When the bone is neither the seat of fracture, angulation or displacement much may be done by general tonic and hygienic measures in conjunction with counterirritation over the coccyx. Local applications of tincture of aconite 3½ drams to the ounce of unguentum belladonna placed over the coccygeal region may relieve the pain. The actual cautery passed lightly over the gluteal region, or faradization with one pole placed against the sacrum or in the vagina, while the other is placed against the coccyx may relieve the pain. Massage of the surrounding tissues sometimes adds to the patient's comfort.

The *surgical measures* are: (1) Subcutaneous section of the attachment of the coccygeal muscles on each side, when the tenderness is in the ligamentous supports; or (2) coccygectomy, which is indicated when the bone is diseased.

A median incision is made over the coccyx, which is freed of its attachments on all sides and removed with bone forceps: The bottom of the wound tends to recede. This may be lifted up by the finger of an assistant in the rectum, while deep sutures of silkworm gut close the entire wound.

Drainage is maintained for forty-eight hours with a strand of silkworm gut.

CHAPTER V.

DISEASES OF THE VAGINA.

ANOMALIES OF THE VAGINA.

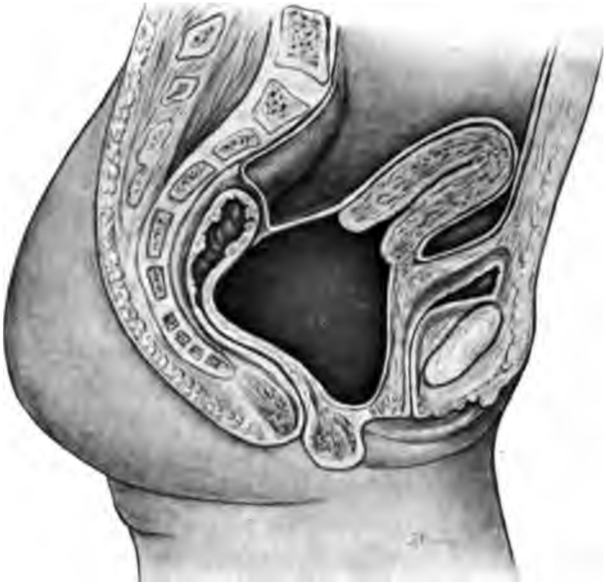
At an early stage of embryonic development the ducts of Müller fuse below to form the vagina and the uterus, while the ununited portion of the ducts above form the Fallopian tubes, consequently, congenital malformations of the vagina, uterus and tubes are largely dependent upon variations in the evolution and failure of fusion of the Müllerian ducts, which explains the frequent coexistence of vaginal and uterine anomalies, though it is by no means uncommon for one organ alone to be defective.

Atresia of the Vagina.—Atresia of the vagina or complete obstruction, may be congenital or acquired resulting from injury or inflammation. *When congenital* it is due to non-development of some part of the canal by adhesive processes during fetal life and occurs only in association with arrested development and atresia of the other branches of the Müllerian ducts.

Acquired Atresia.—Acquired atresia, or obstruction which occurs during life, is usually due to inflammatory adhesion of the vaginal walls in infancy or adult life, resulting from *superficial sloughing of the mucosa from impaired vitality*, as may occur in typhus, scarlet fever, diphtheritic vaginitis, smallpox, or cholera, or *cicatrization after injuries received* in childhood or sloughing and subsequent cicatrization *of these injuries in childbirth*, or superficial adhesive inflammation, as is common at or near the menopause. The atresia may involve the entire length of the vagina or only part of it. It is commonest at the lower portion

Vaginal obstruction results at puberty in the retention of mucus and menstrual blood in the vagina, uterus and tubes, as has already been stated in the description of imperforate hymen. These accumulations are called hematocolpos when the blood is retained and distends the vaginal tube, hematometra when the retained blood distends the

PLATE IV



Hematokolpos Due to Atresia at the Vulvovaginal Orifice.

uterus and hematosalpinx when the blood is dammed back on and dilates the tubes. The distention may be so considerable as to cause rupture of the blood sac into the peritoneum or by adhesion into the intestine. In double vagina and uterus the fluid accumulation may be confined to only one side.

Symptoms.—At puberty the patient experiences menstrual molimena without the appearance of a bloody discharge. At each menstrual date the pain and discomfort gradually increase, the pressure effects on the bladder and rectum and the pelvic tenesmus become more pronounced. The vesical and rectal irritability are constant and distressing. In married women coitus may be impossible; this, however, is dependent upon the situation of the obstruction. *Dyspareunia however,* is always present, as the vaginal tube is necessarily shortened by the atresia, making intercourse painful.

Physical Signs.—The condition is usually obvious on inspection or digital examination. When the obstruction is at the hymenal entrance, the hymen may be seen bulging forward at the ostium vaginæ.

Rectoabdominal examination reveals a fluid tumor in the situation of the vagina and the uterus, these are equally distended and fill the pelvis, or the tumor may extend into the abdomen as far as the umbilicus; when palpation will elicit a fluctuation wave which is transmitted from the abdomen to the rectal finger.

Treatment.—*A mere septum* may be divided with the thermocautery by making a crucial incision in the distended membrane and the retained blood slowly evacuated. Special care should be taken to prevent infection. Annular constrictions may be relieved by deep radial incisions through the constricting ring; when however, the atresia involves nearly the entire length of the vaginal canal, the vaginal tube must be restored by dissection and plastic procedures. This may be done by making a semilunar incision through the skin, just posterior to the vulvovaginal orifice, which opens into the loose cellular tissue between the vaginal and rectal walls, these may be separated by blunt dissection until the uterus is reached, this allows the cervix to be brought into the newly made canal; a sound in the bladder and a finger in the rectum serve as guides during this separation. After the canal is made an attempt should be made to line it with flaps taken from the labia minora or adjacent skin.

Recently a loop of intestine has been successfully used to line the surgically produced vagina. Following all of these procedures a vaginal plug must be worn for many months to keep the vagina patent. For this purpose a pouch of thin rubber tissue may be inserted and packed with gauze or a Sims' glass plug may be introduced.

If the uterus and ovaries are defective, rudimentary or functionally inactive, operation is inadvisable, except to satisfy the obligations of married life.

Absence of the Vagina.—Complete absence of the vagina is usually confined to non-viable, monstrosities. The vagina may be absent throughout its entire length, or only in part; this anomaly is extremely rare and is usually associated with absence of the uterus, tubes, and ovaries. The external genitals may or may not be absent. The defect is due to lack of canalization of the lower portion of the Müllerian ducts, which remain as solid rudimentary epithelial cords.

Diagnosis.—The diagnosis is apparent from the history and the physical findings.

Treatment.—The treatment consists of making an artificial vagina or doing a hysterectomy, but before deciding on surgical procedure, it must first be determined whether or not the uterus and ovaries are present, and if present, whether they are functionally active or inactive.

If the uterus and ovaries are functionally active, an attempt should be made to construct an artificial vagina, to allow for the escape of the menstrual flux. *Experience shows that plastic work of this sort often fails and the opening becomes useless for sexual intercourse; consequently we feel that in cases of absent or rudimentary uterus and ovaries, malformations of this type should be left alone.* Finally, in case the artificial vaginal canal cannot be kept sufficiently patulous to allow for the escape of the menstrual flow, and the menstrual discharges reaccumulate, subjecting the woman to the dangers of intraperitoneal rupture, *abdominal hysterectomy* is the rational procedure.

Double Vagina.—Double or septate vagina is due to an imperfect coalescence and absorption of the lower portions of Müller's ducts. The partition is a longitudinal septum running from before backward or from side to side. It may be complete or incomplete.

It seldom divides the canal into two equal halves, and is usually associated with a double septate or bicornate uterus and a hymen having one or two apertures. Both sides of the vagina may, however, communicate with a single uterus, the upper extremity of the septum being unattached.

Treatment.—A double vagina may interfere with copulation and impregnation or obstruct the passage of the child during labor. Division of the septum with the scissors or the cautery will relieve the obstruction. The vagina should be kept firmly packed with zinc oxide gauze to prevent readhesion.

Unilateral Vagina.—Unilateral vagina is the result of failure of development of one of Müller's ducts. It is commonly associated with uterus unicornis.

WOUNDS OF THE VAGINA.

The vagina may be injured during (1) labor, or (2) coitus, or from (3) external violence.

Injuries During Labor.—Labor is the most frequent cause of vaginal wounds. Lacerations of the vagina may occur as the result of operation and manual deliveries, or result from delayed second stage, when the head becomes impacted and the tissues become bruised and edematous from pressure and subsequently slough, leaving fistulous openings between the bladder, rectum and vagina; or may be caused by extension from a spontaneous rupture of the uterus.

Wounds of the Vagina from Coitus.—Wounds of the vagina from coitus may result from rape on children and young girls, from extension of the hymenal wound at the first intercourse, or from copulation in old women, in whom the tissues have lost their elasticity.

Wounds from External Violence.—Wounds from external violence are of rare occurrence. The reported cases are from falls on penetrating objects, impalement by the horns of cattle, brutality, etc.

Symptoms.—Pain and hemorrhage are the chief symptoms resulting from vaginal wounds, the character of the pain and the severity of the hemorrhage depending on the extent and the location of the injury. Wounds near the vestibule bleed freely, and some degree of shock may be present.

Treatment.—The treatment should be directed toward (1) the prevention of infection; (2) the control of hemorrhage; (3) the relief of pain and shock.

To prevent infection the general principles of surgical cleanliness should be observed.

Hemorrhage may be controlled by ligature or suture of the bleeding vessels.

Moderate doses of morphine relieves the pain and promotes the well-being of the woman.

DISPLACEMENTS OF THE VAGINA.

Rectocele.—Rectocele is the forward and downward displacement of the anterior rectal wall, pushing the posterior vaginal wall (the rectovaginal septum) before it through the vaginal orifice. It is actually a *recto-vaginal hernia.*

Cause.—The most frequent cause is laceration or relaxation of the levatores ani muscles, while the sphincter ani has remained intact. As the head advances through the parturient canal, lacerations of the vagina and pelvic floor occur in one of two ways—the advancing head may strip the vaginal wall loose from its underlying attachments and push it in front of it, or the lavatores and fascia may be torn or overstretched. The action of the external sphincter in drawing the anus backward allows the anterior rectal wall to become overstretched and protrude into the vagina during the straining efforts of defecation. Subinvolution of the uterus and general relaxation of the pelvic structures from repeated labors act as contributing causes. Inversion of the vagina may occur in the nullipara this is usually associated with large pelvis, visceroptosis and a deep cul-de-sac—the peritoneal pouch actually dipping into the space (the areolar tissue) between the leaves of the recto-vaginal septum.

Symptoms.—The symptoms of rectocele depend on the extent of the lesion. The rectocele is usually of gradual formation and produces no inconvenience until the hernial protrusion is of considerable size, when the patient will complain of a *protrusion at* *the vaginal orifice, with more or less* difficulty in defecation, owing to the injury to the levatores the anterior rectal wall is pushed forward and downward out of the vaginal opening and the fecal column is unable to dilate the anal sphincter; or she may complain of a sensation of weight and dragging in the pelvic cavity due to the descent of the uterus and adjacent viscera. Constipation is commonly present.

Treatment.—The treatment is the restoration of the function of the levatores ani by colpoperineorrhaphy.

Cystocele.—A cystocele is a prolapse or "pouching" downward and backward of the posterior bladder wall, with the corresponding part of the anterior vaginal wall, due to injury or relaxation of the vesicovaginal fascial plate. *It is in many instances a vesicovaginal hernia.* Cystocele is commonly associated with prolapse of the uterus. It is possible, however, to have a downward displacement of the bladder and yet have the uterus remain in its normal pelvic position.

In *cystocele* the bladder becomes sacculated and the base of the bladder is on a lower level than the vesical neck, which allows retention and decomposition of the urine within the prolapsed pouch. This produces a cystitis and vesical irritability.

Causes.—The principle causes of *vesical descent* are lacerations of the pelvic floor, separation of the bladder from its uterine attachments and tears or relaxation of the anterior vaginal fascia occurring during labor. Subinvolution of the uterus and vagina tends to aggravate the condition, owing to the close attachment of the bladder to the anterior uterine wall. The vesical plate of fascia is frequently torn away from its bony attachments as a result of forceps deliveries by the unskilled or overstretched from prolonged second stage in spontaneous labor.

Symptoms.—The chief symptoms complained of by the patient are: (1) Frequency of urination; (2) the inability to evacuate the bladder completely; (3) a sensation of weight and pressure in the pelvis; and (4) a protrusion of the anterior vaginal wall through the introitus on walking, standing or straining.

Diagnosis.—The diagnosis may be made on the physical signs. *A cystocele appears as a round elastic tumor of the anterior vaginal wall, and is increased by straining or standing.* By introducing a curved male sound through the urethra into the bladder, with its point turned downward, the limits of the tumor may be accurately defined.

Treatment.—In prolapse of the bladder there is no tendency toward spontaneous cure, the condition grows progressively worse. In slight cystocele, especially in young women, when the uterus is not prolapsed a colpoperineorrhaphy may suffice. In the more extensive vesical prolapse separation of the bladder from its vaginal and uterine attachments and the reëstablishment of the integrity of the anterior vaginal wall by an anterior colporrhaphy will be required, in addition to building up a firm pelvic floor support.

The palliative treatment by pessaries, such as those devised by Skene and Gerhung, has a limited application, and presupposes the existence of a supporting pelvic floor.

INFLAMMATION OF THE VAGINA.

Vaginitis.—Vaginitis or colpitis is an inflammation of the vaginal mucosa. It may be acute or chronic, although it occurs most frequently in the latter form. It may even be chronic from the beginning.

Normally the histological structure. with its several layers of pavement epithelium, together with the secretions of the vagina, offer considerable resistance to bacterial invasion. The secretions are bactericidal in their action; hence it is difficult for pyogenic organisms, which may gain entrance to the vagina, to live and cause inflammatory changes, unless the vaginal secretion is modified in character, or the resisting lining of epithelium is impaired by trauma.

At certain periods and under certain conditions the germicidal action of the vaginal secretion is impaired and thus favors infection of the mucosa, *i. e.;* in childhood and old age the mucosa is delicate and tender, or when the secretion from the cervix or uterus is materially increased, as for instance, at or near the menstrual period; after labor or abortion, or when the uterus is prolapsed or the vulvovaginal orifice relaxed; the vagina becomes more sensitive to bacterial invasion. Acute vaginitis is usually complicated with vulvitis.

Clinically there are four varieties of vaginitis: (1) Simple vaginitis; (2) gonorrheal or specific vaginitis; (3) granular vaginitis; and (4) senile vaginitis. Occasionally diphtheritic vaginitis may occur. Chronic vaginitis usually occurs in patches.

Causes.—The causes are *predisposing* and *exciting*.

The *predisposing causes* may include anything which impairs the local resistance of the vagina to infection, *e. g.*, mechanical or chemical irritants, youth, old age, feeble health, local and systemic conditions resulting in the desquamation of the vaginal epithelium.

The *exciting causes* are the various bacteria, as the gonococcus, streptococcus, staphylococcus, Bacillus diphtheriæ, and the colon bacillus. The gonococcus is especially active in the etiology of vaginitis in children. In the exanthemata the vaginal mucosa participates in the general inflammatory involvement of the mucous membranes, while the streptococcus and other pyogenic bacteria play an active part in the causation of puerperal vaginitis. Irritating discharges, cauterants, and mechanical irritants produce a simple vaginitis.

Symptoms.—The symptoms of acute vaginitis vary with the severity of the involvement. There is commonly a feeling of heat and pain in the vagina which may be dull or intense in character, a throbbing sensation in the perineum, backache, and slight elevation in temperature. The vaginal secretion is at first diminished; it then becomes thin, white and mucose, and finally appears as a profuse mucopurulent or purulent discharge which causes intense vulvar pruritis.

The local symptoms all are more pronounced at the time of the menstrual epoch. There are usually no urinary symptoms in *simple vaginitis*. The vaginal walls are red, swollen, hot, and sensitive, and are bathed in a purulent discharge.

In the *acute gonorrheal form* the history of suspicious intercourse is suggestive. The symptoms are more intense, the discharge is more profuse, purulent, yellowish or greenish in appearance, and of faintly acid or neutral reaction.

The gonococcus can be demonstrated microscopically. The Bartholin ducts, the urethra and urethral glands are usually involved so that frequent and burning urination is the rule. Pus may be expressed from the urethra, Skene's glands, and from the ducts of Bartholin's glands. *Vegetations may appear about the vulva.*

In the *chronic form* there may be few or no symptoms except vulvar irritation due to the ichorous discharge.

On inspection the vaginal mucous membrane is dark red or bluish in color. It is more or less thickened, and studded with small red patches of erosion (infiltration of the papillæ of the mucosa) which bleed easily. In the gonorrheal form exacerbations may occur near the menstrual periods when the gonococcus may be demonstrated in the discharges.

Granular or papillary vaginitis is usually subacute or chronic. The papillæ of the vagina become infiltrated, which gives the mucous membrane a granular appearance. The granulations are hemispheric in shape, small in size, and scattered over the upper posterior surface of the vagina and cervix.

Vaginal granulations may result from gonorrheal infection, or from the congestion of pregnancy. They are seldom associated with simple vulvitis.

The symptoms *are usually not severe.* There may be a sense of fulness in the vagina and a sero- or mucopurulent discharge which causes severe vulvar pruritis. Eczematous patches on the vulva are frequently present in this form of vaginal inflammation. Inspection shows many small granulations scattered over the vagina and cervix.

Senile vaginitis or *adhesive vaginitis* is usually found in women past the menopause. It is characterized by the formation of adhesions due to the atrophic changes of old age which result in defective nutrition and local destruction of the surface epithelium *lining the vagina.* Those denuded portions of the vaginal wall which come in contact with each other are apt to become adherent.

The symptoms which cause the patient to seek advice are a thin, serous, leucorrheal discharge which is seldom profuse, but is frequently stained with blood, and a burning sensation in the vagina or a feeling of *weight in the pelvis, or marked irritation* (pruritus or dermatitis of the external genitals); marital relations may be painful or impossible, owing to the atrophic changes in the vaginal walls.

On inspection the mucous membrane is found smooth, having lost its rugæ; ecchymotic spots and superficial ulcerations are seen scattered over its mucous surface, which is moistened with a scanty serous secretion. Digital exploration may detect adhesions between the cervix and vagina or between the opposing vaginal walls.

Prognosis of Vaginitis.—The prognosis of vaginitis is usually good, in other than the gonorrheal variety. Infection due to the gonococcus may extend to the endometrium, tubes, ovaries, and pelvic peritoneum.

Chronic vaginitis is most persistent in the fornices, especially in the gonorrheal variety.

In diphtheritic cases and those due to active cauterants or irritants (as an ill-fitting pessary) atresia of the vaginal tube may result from sloughing of the mucosa and adhesion of the opposing walls, or stenosis may ensue from cicatricial contraction. In the granular form the affection often disappears spontaneously at the end of gestation. Senile cases are usually more or less intractable.

Treatment.—The treatment in acute vaginitis should include: (1) Rest in bed; (2) proper regulation of the bowels; (3) dietary restriction; (4) the relief of pain; and (5) local disinfection.

Rest in bed is essential during the acute stage, even in mild cases. The bowels may be regulated with saline laxatives, or laxative waters. An alkaline, salt-free or non-stimulating diet contributes to a happy termination. Codeine ½ to 1 grain in suppositories may be used to relieve the pain. Prompt local treatment with douches and topical applications effect a speedy cure.

Germicidal douches are especially valuable in gonorrheal and septic vaginitis. The douche should be copious and given several times a day, with the douche-can or bag at low elevation, used in the following strengths: potassium permanganate 1 to 4000; sublimate solution 1 to 5000 or 10,000; lactic acid half-ounce to the quart, or carbolic acid 1 to 2 per cent; are efficient antiseptics. It is well to cleanse the external genitals and flush the vagina with a mild alkaline irrigation of borax or saline before using the germicidal douche.

The vagina should then be carefully dried with sterile cotton and the mucosa exposed with a speculum, when a tampon of wool or gauze saturated with a 25 per cent aqueous solution of argyrol is inserted against the cervix. This supported by a second tampon moistened with glyceride of picric acid or ichthyol (5 per cent) in glycerin which is placed in contact with the inflamed surfaces of the vagina.

In the acute gonorrheal variety, a cleansing alkaline douche removes the pus, while topical applications of argyrol, 25 per cent; silver nitrate, 2 to 4 per cent; or tincture of iodine painted over the entire mucosa destroy the *Neisserian coccus.*

In foreign clinics the dry treatment has general endorsement. The inflamed surfaces are exposed by a suitable speculum, dried thoroughly, and completely covered with bismuth subcarbonate, which is blown into the mucous membrane with a powder blower. Chronic vaginitis is often obstinate, especially if the gonococcus has been the causative agent. Topical applications of silver nitrate solution in 2 or 4 per cent strength, followed by light packing of the vagina with a gauze tampon saturated with a glyceride of picric acid, or liquid zinc oxide ointment, repeated once or twice daily, have been most efficient in preventing a bacterial extension. General treatment and hygienic measures do much toward contributing to the cure. Large quantities of pure or alkaline water are especially beneficial, as is also the free use of urotropin and benzoate of soda.

NEW GROWTHS OF THE VAGINA.

Cysts.—Cysts of the vagina are relatively infrequent, occurring about once in every six hundred and ten women who come for examination. They are usually solitary; rarely more than two or three are ever present. When multiple they tend to arrange themselves in rows in the upper part of the vagina along the anterior wall. They are also found in the lower part of the vagina. They vary in size from that of a *pea to that of a cocoanut.* Age apparently has no influence in their etiology, as they are found in virgins of all ages as well as in women who have borne children.

The origin of these cysts are: 1. Embryonic, due to the accumulation of fluid in the remains of the Wolffian canal and Gärtner's. ducts found along the lateral and anterior vaginal walls in the upper part of the vaginal canal or cervix uteri. Cysts of Gärtner's duct may assume large proportions. Such cysts are often multiple and arranged in rows, or the cysts may occur in the remains of Müller's ducts (in the wall of the developed half of a vagina duplex, the other half being rudimentary).

2. *From epithelial inclusions of the scar tissue.* Islands of vaginal epithelium may become imbedded in the submucous tissue as the result of childbirth, trauma, or operation, and produce the small cysts found in the lower portion of the posterior vaginal wall. They are relatively small varying in size from that of a pea to that of a hazel nut and are filled with friable sebaceous material.

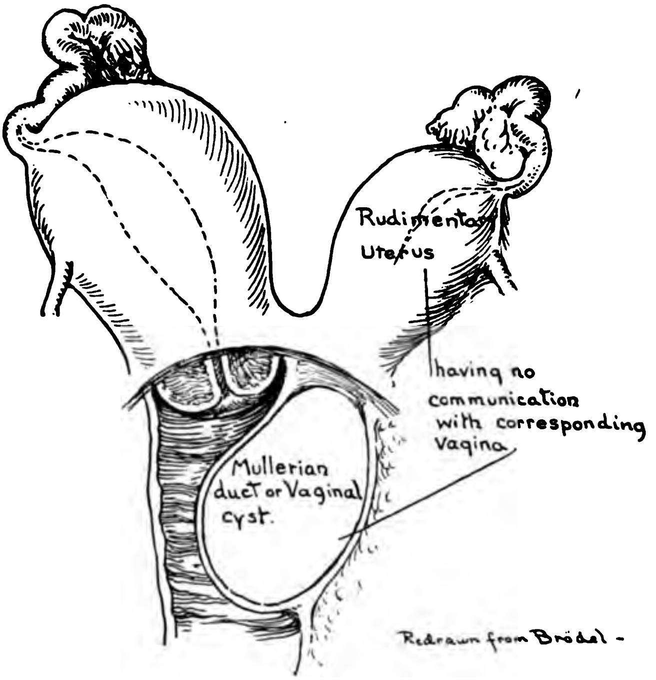

Rudimentary Uterus
having no communication with corresponding Vagina
Mullerian duct or Vaginal cyst.
Redrawn from Brödel -

FIG. 19.—Vaginal cyst developed in the remains of the Müllerian duct.

3. Rarely from the *adhesion of folds of mucosa.*

4. From *obstruction in the outflow of the vaginal glands.* With the formation of retention cysts in aberrant vaginal glands lined by columnar epithelium. Preuschen and others have demonstrated the presence of glands in the vagina, duct-like glands lined with columnar epithelium, especially in the upper part.

5. From the echinococcus.

Finally, *dermoid cysts* may develop in the rectovaginal septum.

Pathology.—Vaginal cysts are slow in their development. The tumor is usually the size of a bantam's egg, with a limiting wall of variable thickness lined with a single layer of cylindrical epithelium. The content is usually a clear straw-colored, viscid fluid, which sometimes becomes a dark brown color from the presence of disorganized blood. The cyst may become infected by pyogenic organisms and suppurate.

Symptoms.—The symptoms depend largely on the size and location of the tumor. Small cysts cause no symptoms and are only recognized by accident in the course of pelvic examination. Large cysts may cause functional annoyance from pressure on the vesical neck or urethra, producing irritability of the bladder, or from pressure on the rectum cause constipation, hemorrhoids, etc.; or by obstructing the patency of the vagina, interfere with marital relations or produce dyspareunia. Occasionally the tumor may be of such size as to cause the woman to complain of pelvic tenesmus and offensive leucorrhea by obstructing the vaginal drainage.

Diagnosis.—The vaginal cyst is usually smooth, round, and circumscribed, with tense elastic walls encroaching upon and diminishing the lumen of the vagina. The mucous membrane of the vagina moves freely over the surface of the tumor, and is smooth and shining. Unless the tumor has become infected, fluctuation may be easily elicited. If the tumor is on the posterior wall rectovaginal touch will promptly reveal its limitations and consistency.

When on the anterior vaginal wall near the cervix it may be necessary to introduce a sound into the bladder to determine the limits of this viscus while the index finger in the vagina determines the character and the limits of the cyst. Cystocele and rectocele, with which on inspection the growth may be confounded, are easily distinguished, as they are increased in size when the patient strains down; rectovaginal or rectoabdominal examination will efface all doubt. Solid growths are distinguished by their density.

Treatment.—Very small cysts may need no attention. Large tumors may be extirpated by incision of the vaginal mucosa and enucleation of the cyst from its connective-tissue bed. The resulting cavity may be closed by layer sutures of iodized catgut.

When extirpation is impracticable the cyst may be incised and its wall partially exsected or its lining wall destroyed with the actual cautery or its cavity firmly packed with gauze; after cutting away the excess of cyst wall, the remaining portion may be everted and stitched to the vaginal mucosa, thus turning the cyst cavity out into the vagina.

Myomata of the Vagina.—Fibroid tumors very rarely originate in the vagina. Like similar tumors of the uterus, they consist chiefly of fibrous tissue surrounding bundles of unstriped muscle fibers. They are usually single and situated in the upper part of the anterior wall. They are commonly sessile, but may from their weight become pedunculated. A fibroid of the vaginal wall is seldom larger than 6 cm. in diameter.

Diagnosis.—The diagnosis is made upon the situation and the physical characteristics of the tumor. Its sharp definition, its smoothness and density.

Treatment.—The treatment consists, when the tumor is sessile, of division of the capsule and of the overlying mucosa, and enucleation of the growth. When pedunculated, of compression and division of the pedicle with the electro-cautery forceps.

Sarcoma of the Vagina.—Sarcoma of the vagina is rare as a primary disease. In adults it appears as a diffuse growth that may be situated in any part of the vaginal canal. In children and young adults the passage is found to be filled with a polypoid grape-like mass, which springs from the anterior vaginal wall, polypoid in its attachment and rapidly breaks down. Histologically, these growths are mixed celled in structure and extremely edematous and hemorrhagic.

The prognosis is very bad in the grape-like sarcoma of children; the growth rapidly reappears after removal.

In adults circumscribed sarcomata may be found, these are histologically of the spindle celled variety. The least malignant form are the round celled sarcomatous growths; which if discovered early may yield to radical excision.

Carcinoma of the Vagina.—Primary carcinoma of the vagina is extremely rare. Most often situated high up on the posterior wall. The growth is of the squamous cell variety.

Secondary involvement may occur either from extension or metastasis.

The majority of the few cases reported have occurred in women between thirty and forty. It appears in two forms, either as a localized broad-based papillary swelling, seated most frequently in the posterior wall, or as a diffuse infiltration constricting the canal. The inguinal and pelvic glands are soon invaded.

Symptoms.—Intense burning and pruritus may precede the classical symptoms of hemorrhage and fetid discharge. The hemorrhage is usually first noticed after coitus or following the introduction of the douche nozzle. As the disease progresses the bleeding becomes more continuous. The disease usually takes the form of a surface ulceration with a raised and everted edge.

The discharge is at first watery and profuse; as tissue necrosis takes place it becomes sanguinopurulent and fetid.

Diagnosis.—The diagnosis is made on the physical characteristics of the growth, its friability, infiltration, and the microscopic examination of the excised sections.

Treatment.—The treatment is unsatisfactory, as the growth is seldom recognized sufficiently early for radical extirpation. Exposure to the filtered rays of radium or mesothorium seem to offer the most encouraging results.

Other growths of the vagina are papilloma and chorio-epithelioma, which are usually secondary to similar growths in contiguous organs.

Early extirpation offers the only hope of cure, although radium may control the rapid extension.

CHAPTER VI.

LACERATIONS OF THE PELVIC FLOOR.

Before considering puerperal injuries to the pelvic floor, it may be well for the reader to have a general knowledge of its topography and functions, for a large number of pelvic lesions are directly or indirectly dependent upon defects in its muscles or fascial sheaths. The pelvic floor is the lower diaphragm of the abdominal cavity. It gives support to the pelvic and abdominal contents, and is composed of skin, connective tissue, fascia and muscles. It closes the outlet of the bony pelvis. Its superior surface is concave and limited above by the peritoneum, except where this structure is reflected over the pelvic organs and their appendages.

Its inferior surface is covered with skin and is convex from before backward.

Its median portion is obliquely traversed by three muscular slits, the urethra, vagina, and rectum. These canals are approximately parallel with the plane of the brim, except that the end of the rectum turns backward nearly at a right angle with the vagina. The levatores ani and the pelvic fascia support the rectum, and in doing so, the posterior vaginal wall, which is closely connected with the anterior wall of the rectum, is also supported.

The pelvic floor extends from the pubes to the coccyx, and its lateral limits are the rami of the pubis and ischium, the tuberosities of the ischium, and the sacrosciatic ligaments. The anterior vaginal wall and the soft parts in front of it constitute the pubic segment, the posterior vaginal wall and the soft parts behind the sacral segment, of the pelvic floor. It helps to support and maintain the pelvic viscera in their proper planes. The two halves of the pelvic floor meet in the median line.

The most important structures of the pelvic floor are its fascial sheaths and the levatores ani muscles, contraction of the levatores ani muscles elevates the rectum while the external sphincter contracts the anus—and because of its attachment to the coccyx—draws the anus backward. During normal labor the pubic segment of the pelvic floor with the bladder is drawn upward as the presenting part descends lower in the pelvis, while the sacral segment is pushed downward and forward by the advancing head, until at the moment of expulsion the length of the sacral segment from the coccyx to the lower edge of the vulva orifice is 15 to 17.5 cm. (6 to 7 inches). *Childbirth is generally the cause of pelvic-floor injuries,*

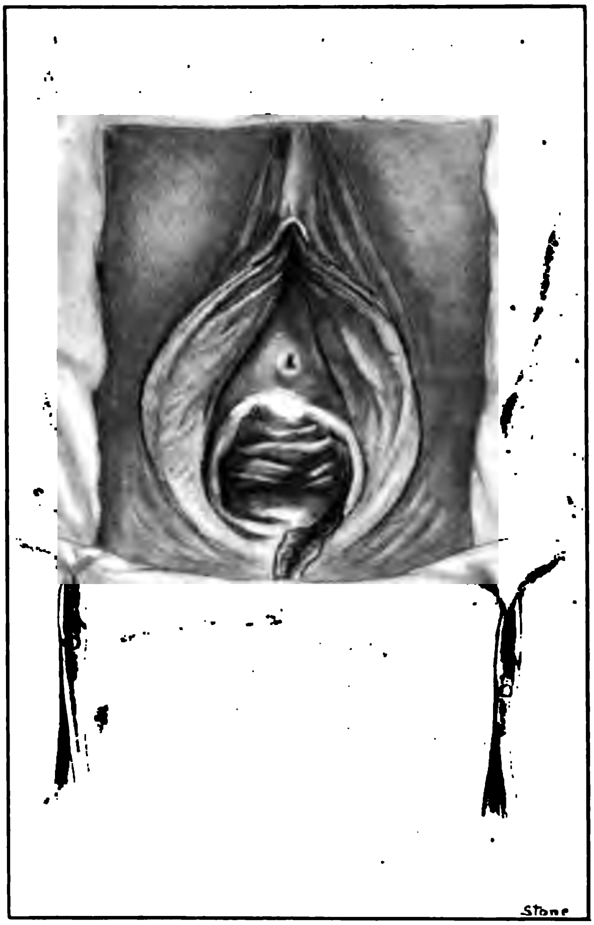


FIG. 20.—Unilateral laceration of pelvic floor, tear going up the right sulcus (primary).

hence puerperal lacerations may be A, Incomplete; B, Complete under the first heading there are (1) *Superficial or external tears,* involving only the skin and superficial muscular structures between

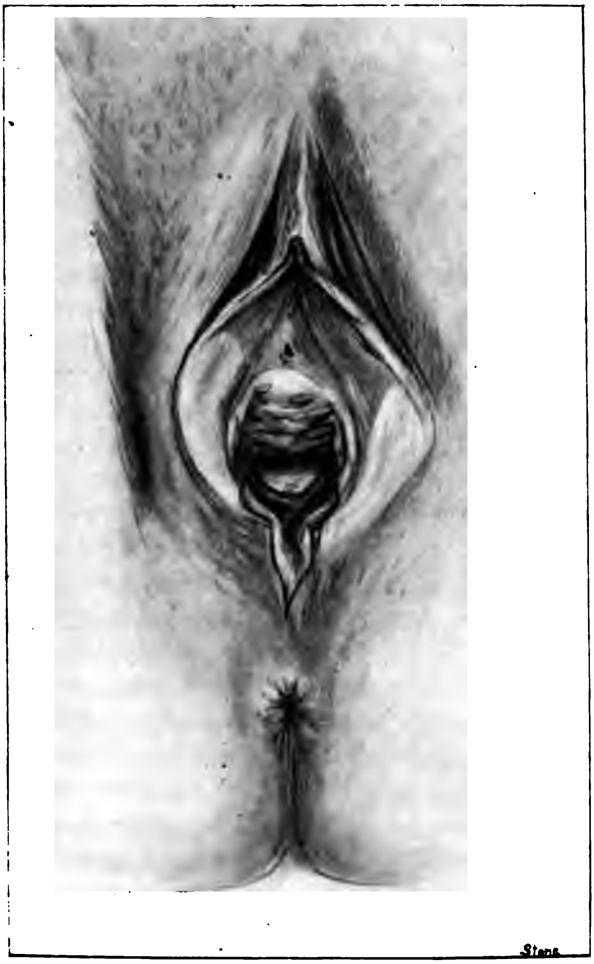


Fig. 21.—Bilateral internal and external tear (primary).

the posterior margin of the vulvovaginal orifice below the attachment of the levatores ani muscles. These tears are usually in or close to the median line, and do not materially weaken the pelvic support.

2. *Internal, lateral, or sulcal tears* involve the vaginal sulci. In this variety the laceration extends from the fourchette up one or both vaginal sulci, severing the anterior fibers of the muscular structures of the levatores ani and fascia on one or both sides of the median line within the vaginal orifice. Purely internal tears are infrequent, except in young primiparæ with an ample pelvic outlet, who have been subjected to a long second stage; usually the sulcal tear is accompanied by a superficial median tear toward the anus. The laceration is frequently bilateral, and is commonly more extensive on the left side. The sphincter ani is usually not involved, hence the anus and lower end of the rectum is drawn backward, while the middle portion deprived of its natural supports is pushed forward into the vagina by the column of feces during defecation. Therefore a rectocele of varying degree is a constant sequel of these tears which destroy the muscular attachments of the rectovaginal septum. Combined external and internal tears are the commonest form of pelvic-floor laceration.

Complete median tears may involve all of the soft structures between the vagina and the posterior rectal wall, including the sphincter ani muscle. The sphincter never tears exactly in the median line, but just to one side of it. In this variety, the injury may extend from a half to three inches up the rectal wall.

Incomplete tears fall short of the rectum.—Complete tears enter the rectum, dividing the sphincter ani muscle just to one side of the median line. The principal contributing and exciting causes of pelvic-floor injuries may be found in the *funnel pelvis,* with its narrow pubic arch, which pushes the advancing head backward so that the nucha pivots on the ischiopubic rami, instead of on the subpubic arch in extension, and thus exposes the posterior segment of the pelvic floor to greater distention. A relatively small vulvovaginal orifice or rigidity or edema of the pelvic floor, or prolonged second stage in a primipara advanced in years predispose to lacerations because of the inelasticity of the pelvic soft parts.

Faulty mechanism, as unrotated occipito-posteriors, in which the flexion is incomplete; too rapid delivery, without previous preparation of the vagina and vulvovaginal orifice, and the *unskilled and the improperly timed use of instruments* make up the chief exciting causes. The essential part of the injury in all tears demanding secondary operation is the laceration of the *fascial attachments which connect the pubic portion of one or both levatores ani muscles* with the so-called perineal body and rectal sheath.

Symptoms.—The symptoms produced by pelvic-floor injuries are dependent upon the extent of the laceration, and are progressive. Laceration of the vaginal sulci retards the normal involution of the vagina and uterus by disturbing the normal circulatory equilibrium and favors displacement of the latter organ, causing sacral backache and pelvic tenesmus, which is increased by standing or walking, and eversion of the vaginal walls with the development of a rectocele or cystocele with the associated constipation or inability to empty the lower rectum of the fecal mass, this is owing to the protrusion of the anterior rectal wall between the edges of the torn levatores. The cystocele produces irritability of the bladder. The straining at stool and the consequent prolapse of the unsupported anterior vaginal wall lead to the further descent of the heavy, misplaced uterus and prolapse of the vagina. The symptoms are all relieved by the woman assuming the recumbent posture.

In sphincter injuries there is incontinence of feces.

Prolapse of the uterus and its associated symptoms are not as marked in complete lacerations as when the sphincter ani has escaped injury, owing to the fact that sphincteric tears occur in funnel pelves and therefore the anterior fascial sheaths and attachments remain uninjured. Furthermore, no rectocele develops; hence the cervix is not pulled forward and downward with each straining effort.

Physical Signs.—*On inspection* the split in the fourchette or the presence of cicatricial tissue in the perineum may be apparent, or there may be sagging of the pelvic floor in proportion to the injury to the fascial supports.

The anus and vaginal orifice are displaced backward.

There is gaping of the vulvovaginal orifice.

The posterior is not in contact with the anterior vaginal wall throughout.

A rectocele or cystocele may be apparent through the relaxed introitus, or perceptable only on standing and straining.

On palpation, in incomplete tears, the loss of perineal tissue or the lack of levator muscle support may be demonstrated by introducing the index finger into the vagina and placing the thumb externally over the perineum with its tip near the anal margin, and compressing the intervening tissues between them, with the internal finger placed first in one vaginal sulcus, then in the other.

In complete tears the anus gapes, while the location of the sphincter end, on each side, is marked by a dimple just to the side of the anal margin. In this form of injury there is usually little or no rectocele or cystocele, or uterine prolapse.

Treatment.—*Practically all injuries of the pelvic floor except* superficial median tears, demand surgical treatment.

Immediate repair prevents infection of the torn surfaces, retraction and atrophy of the muscular and fascial structures, and should be done unless the condition of the patient from loss of blood or other causes contraindicates an immediate operation, or the repair may be postponed for forty-eight hours or deferred until after the period of lactation is over, when a colpoperineorrhaphy should be done.

Technic of Colpoperineorrhaphy.—*Preliminary Preparations.*—The bowels should be evacuated with an enema the evening before the operation, and the vulvar hair removed with a razor or clippers. After this has been done the vulvar orifice, the pubes, and inner surfaces of the thighs should be carefully scrubbed with soap and warm water, using a gauze pad as a "scrub," rinsed with sterile water and bathed with a 1 to 2000 bichloride solution.

At the time of operation the patient is anesthetized and placed in the lithotomy position at the edge of the table. The bladder is emptied with a catheter and the labia, pubis, and surrounding skin painted with one-half strength tincture of iodine.

Sterile coverings protect the surrounding surfaces and extremities. The vagina is dried with a sterile gauze sponge and swabbed with half-strength tincture of iodine.

External tears seldom require secondary operation, but when the injury has to be repaired, the area corresponding to the cicatrix should be denuded and the wound approximated with chromic catgut sutures, beginning on the skin surface and closing the wound from below upward.

Incomplete tears (combined external and internal injuries).

Operation. With the patient in the lithotomy position and the field of operation prepared as described above, a sterile towel once folded, is stretched horizontally across the perineum, covering the anal orifice and held in place by stitching or clamping it to the skin of the perineal body and the buttocks. A "guy-line" of black silk is now passed through the mucosa of the rectovaginal septum in the median line, at the crest of the rectocele, while similar "guy-lines" pass through each posterior caruncle or a little above it, and a Kocher forceps is fixed centrally in the skin edge at the lower limit of the field of operation (Fig. 22).

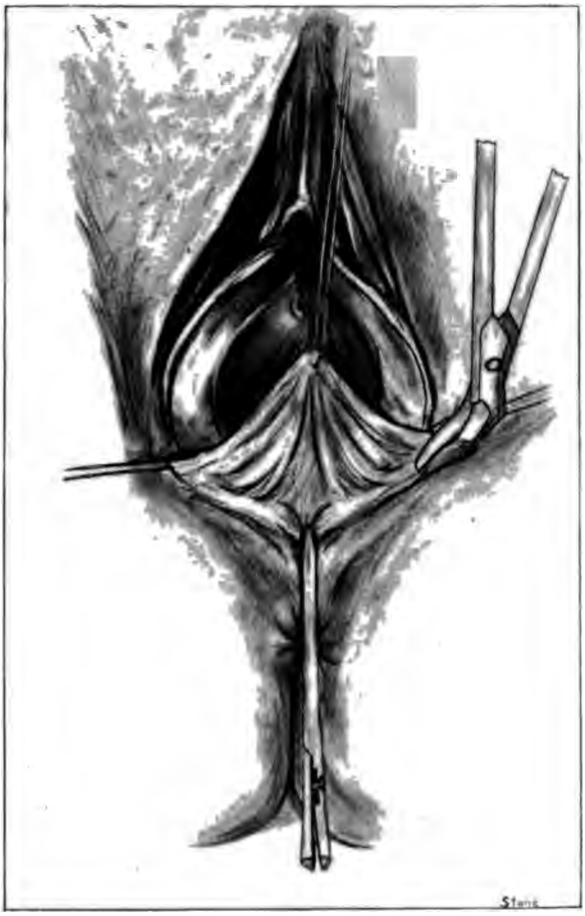


FIG. 22.—The outline of cicatricial and redundant tissue, is marked by grasping the crest of the rectocele and carunculæ on either side with silk "guys." Kocher forceps marks the center of the mucocutaneous margin.

Traction outward from the center made on these "guy-lines" will outline the area of cicatricial and redundant tissue to be removed by denudation (Fig. 22).

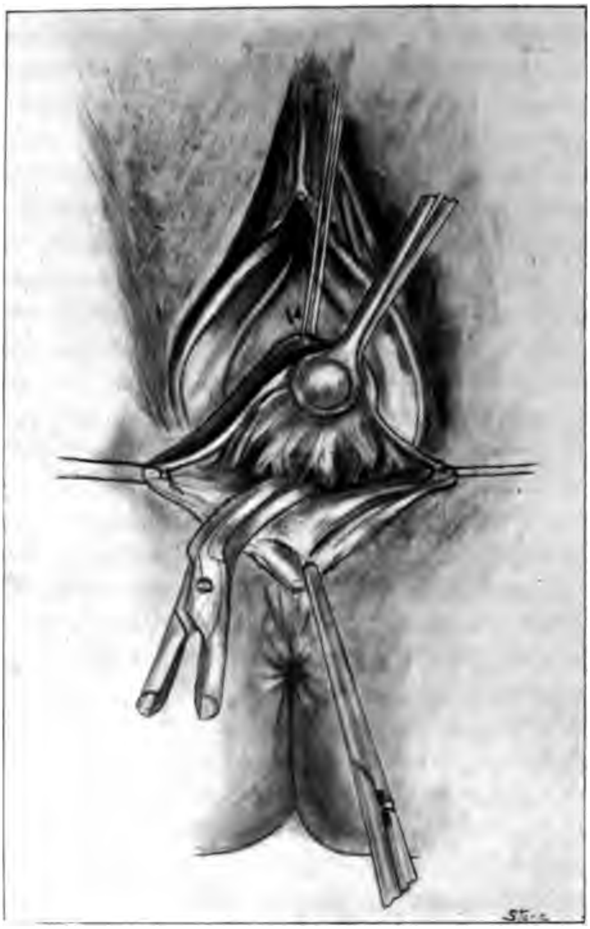


FIG. 23.—Separating the vagina from the rectocele by blunt dissection.

The mucocutaneous fold at the lower border of the field, just posterior to the caruncle, is caught up with rat-tooth forceps and excised with scissors from left to right, following a curved line just above the margin of the perineal skin, and terminating at the caruncle on the right side. The vaginal mucosa is then caught up at the lower limit of the scar tissue in the median line making a longitudinal fold, and a pair of blunt-pointed scissors curved on the flat, pushed up between the vaginal and rectal wall to the level of the upper central "guy-line." On spreading the scissor-blades the vagina is detached more or less completely from the rectal wall along the line of cleavage. A ring forceps is now placed on the vaginal flap, which is pulled upward, and the rectocele is separated from its vaginal attachments by blunt dissection (Fig. 23), pushing

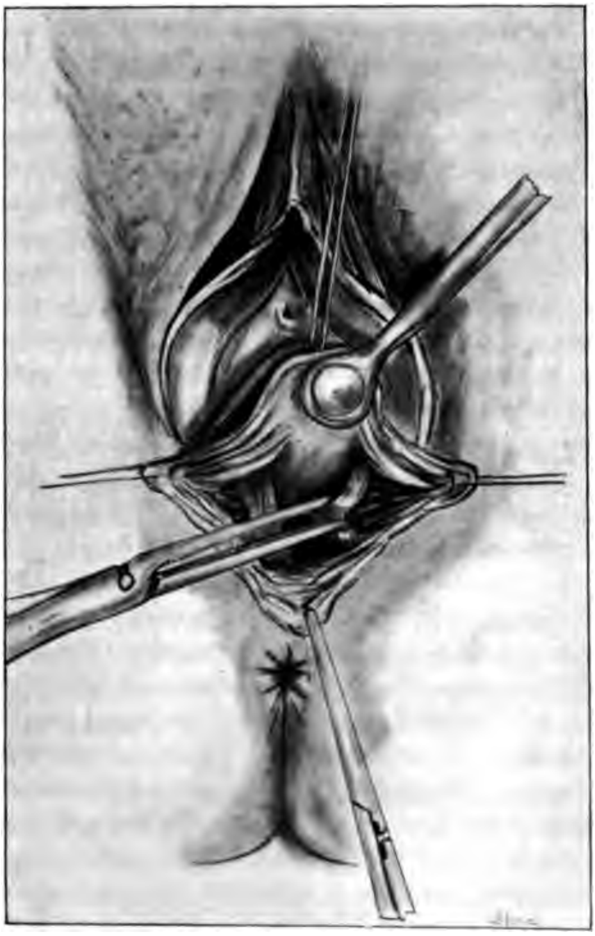


FIG. 24.—Levators exposed and drawn out with volsella.

it off with gauze, carrying the dissection well over into each lateral sulcus, exposing the edges of the levatores ani muscles. The levatores ani are grasped with four-pronged volsella, and brought out

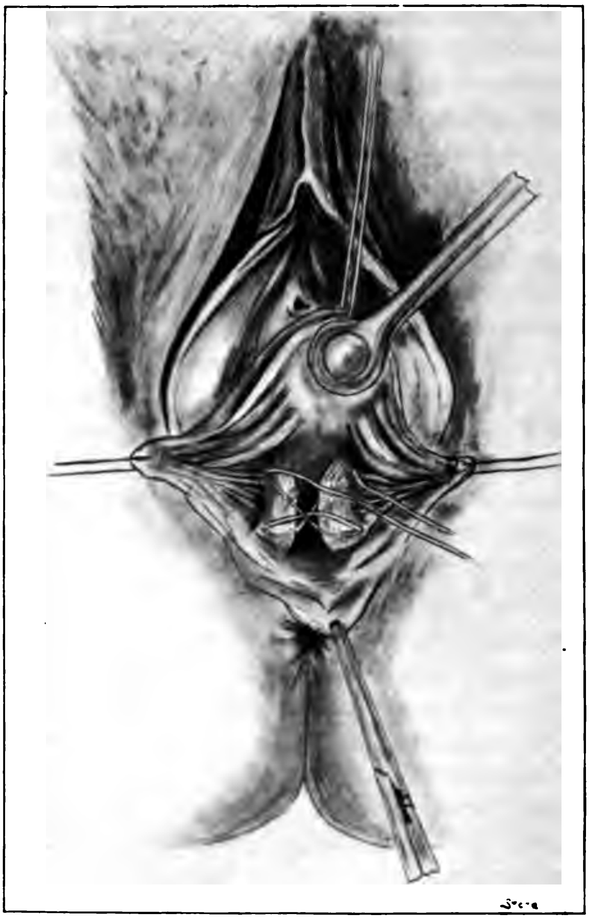


Fig. 25.—Levators exposed and suture in place.

toward the median line in front of the rectocele, *and held in this relation by two or three interrupted chromic catgut sutures passed through the muscle and its overlying fascia* (Figs. 24 and 25).

The redundant vaginal mucosa is then excised from each lateral

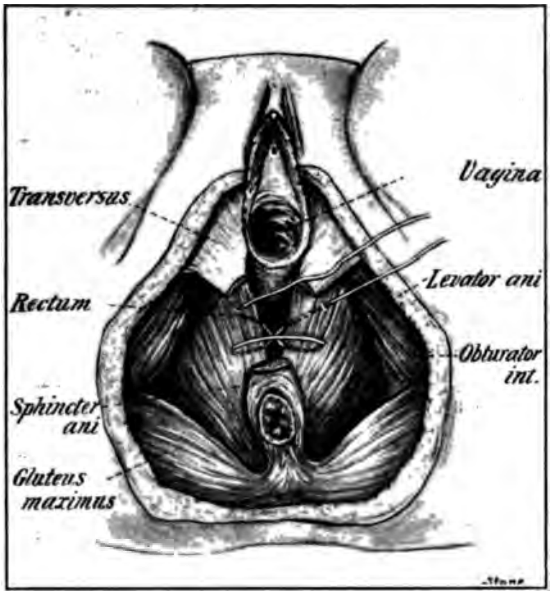


Fig. 26.—Dissection of pelvic floor, with transversus perineum cut away. Suture in levators bringing the muscles in front of the rectocele.

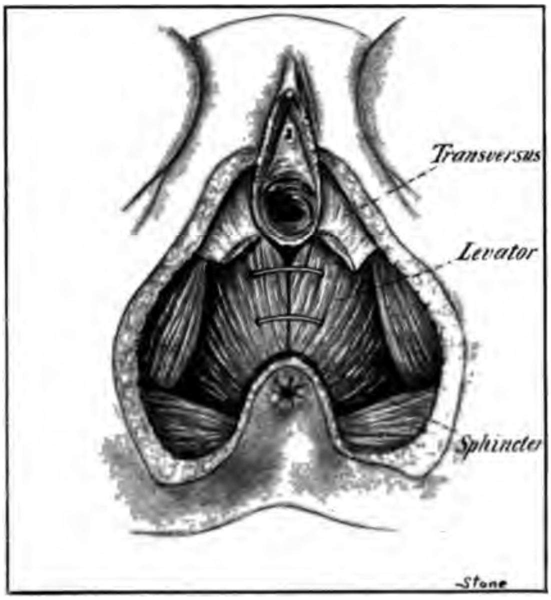


Fig. 27.—Levator suture tied.

sides (Fig. 28) to narrow the vagina, and chromic catgut sutures introduced, beginning at the upper angle of the wound, uniting the lateral vaginal wall with the central tongue (Fig. 29), until the

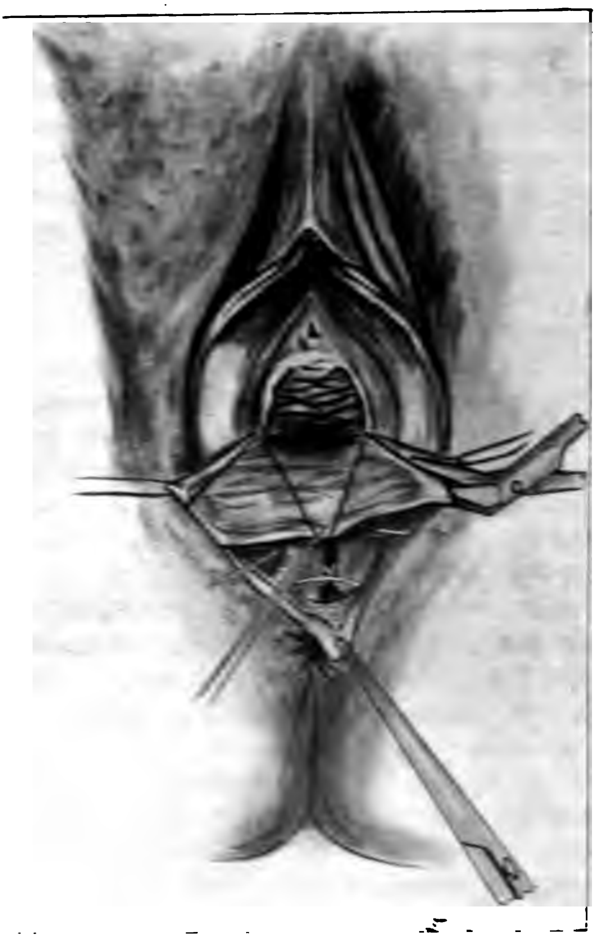


Fig. 28.—Excision of the redundant vaginal mucosa to narrow the vagina.

caruncles are reached with a full-curved, smooth pointed needle armed with silkworm gut is introduced at a point just outside the caruncle on one side, through the tip of the central flap (Fig. 30) to emerge at the caruncle of the opposite side.

This is known as the crown stitch. With this stitch carried upward and held taut, the vaginal introitus is shown in its reconstructed form, and nothing remains but to close the fascia in the perineal body and the ends of the transversus perinei with a running suture of iodized catgut and approximate the skin edges with interrupted sutures of fine chromic catgut or silkworm gut if the latter is used for the superficial closure, the ends are left long and tied together—bunching the ends of the sutures together facilitates their removal.

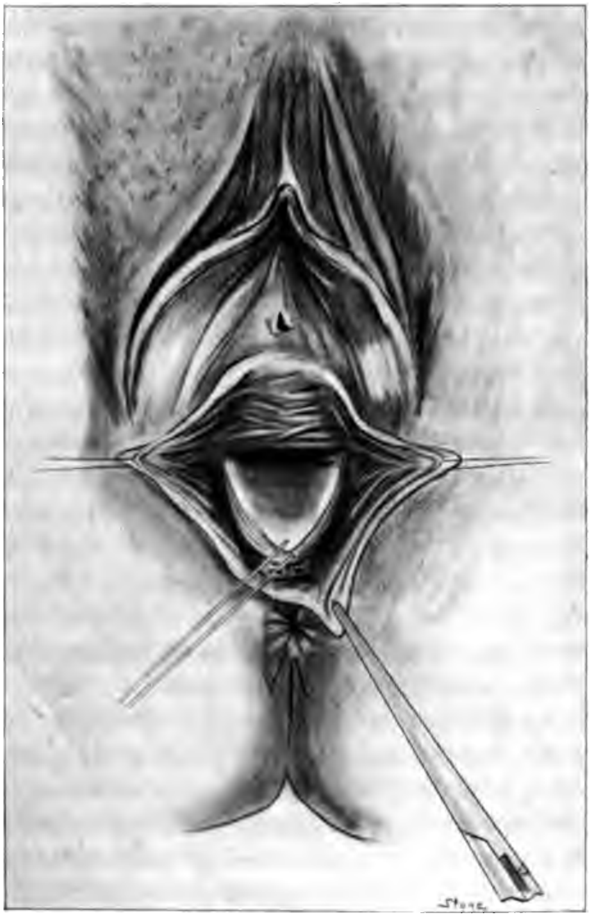


FIG. 29.—Denudation before placing angle sutures. Levators united.

If the work has been properly done, the anterior and posterior vaginal walls are brought in contact, the vulvar orifice has resumed its normal appearance, the perineal body is deep and strong and unless torn again no subsequent relaxation is observed.

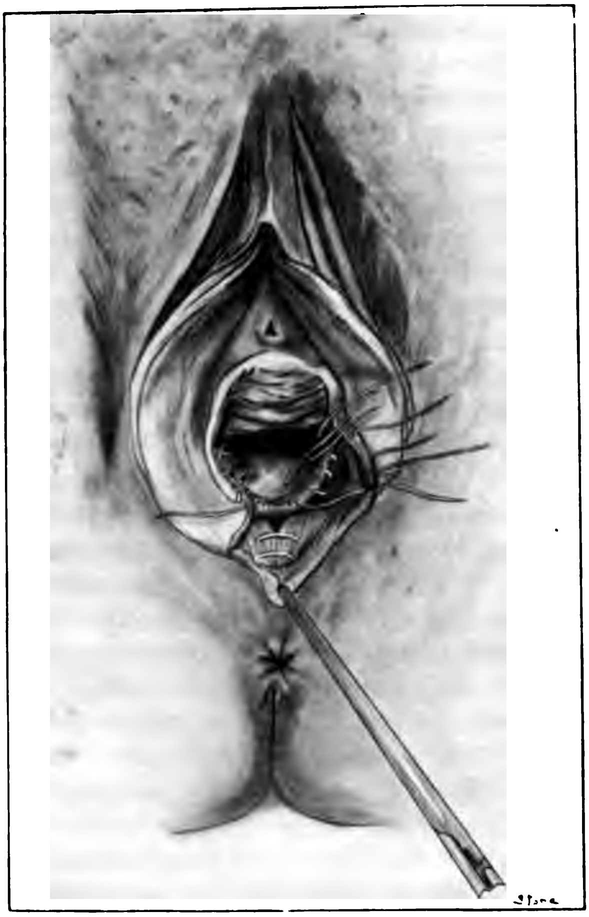


FIG. 30.—Angle sutures and "crown" suture in place.

The after-treatment consists of irrigating the parts with a weak bichloride solution (1 to 10,000) after each urination, and then leaving the operation field alone. Vulva pads tend to produce infection of the suture line by smearing the wound with fecal discharges. The external non-absorbable sutures are removed in ten days, and the patient allowed to leave the bed in two weeks.

Complete Tears.— *The fundamental principle in the repair of complete tears is to convert each tear extending into the rectum into an incomplete laceration by the restoration of the continuity of the rectal wall and the isolation and suture of the severed sphincter ends.* Secondary operations on the rectum and anal sphincter should be preceded by completely emptying the lower bowel with a dose of oleum

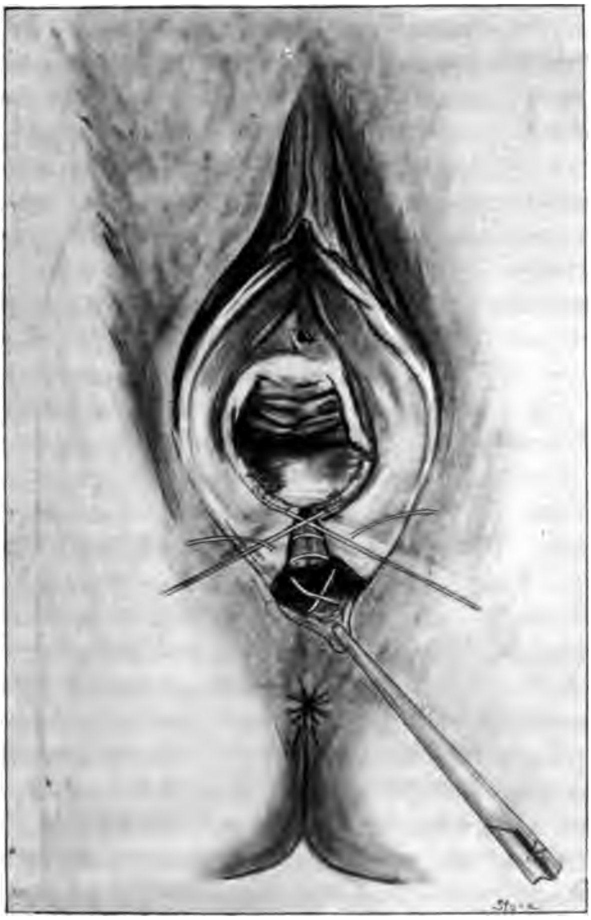


FIG. 31.—Angle sutures tied and "crown" suture shown held taut. Deep sutures through levators shown.

ricini ℥ ij, to which is added menthol gr. x, and tinctura opii camphor ℥ ij, given thirty-six hours prior to the operation. After the bowels are thoroughly evacuated, the rectum and pelvic colon should be irrigated with normal salt solution and further movements checked by administering 15 ♏ of deodorized tincture of opium.

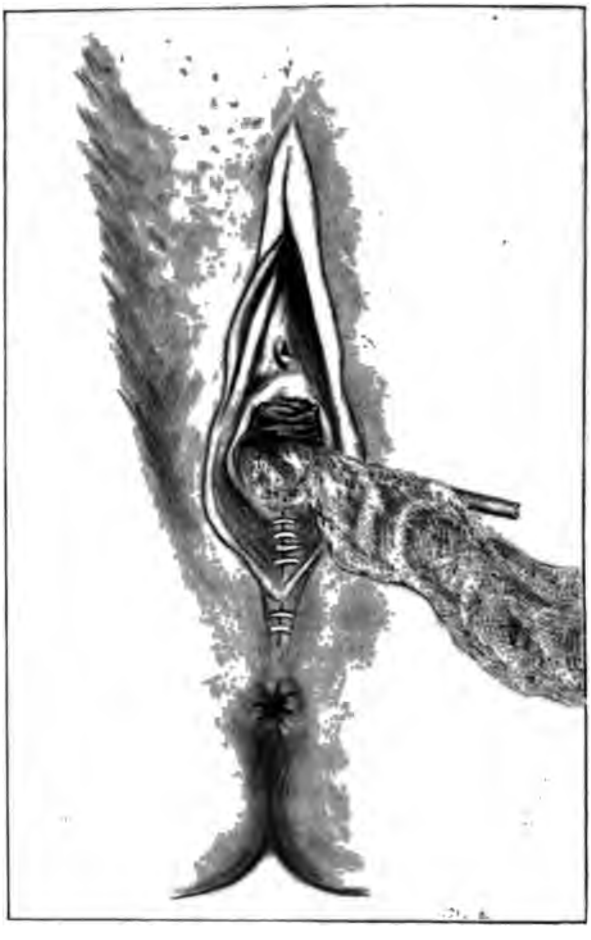


Fig. 32.—The vagina is lightly packed at the completion of the operation.

Operation for the Restoration of a Torn Sphincter, with no Injury to the Anterior Wall of the Rectum.—After the field of operation has been properly prepared a "guy-line" is introduced just above each lateral caruncle and the vulvovaginal orifice exposed by making lateral traction. A slightly curved incision with its convexity upward is made transversely across the vaginal plate above the sphincter ends, and one-third of an inch or more above the rectal mucous membrane. From the ends of this incision lateral incisions are carried downward and outward, passing just without the sphincter ends. The flap of vaginal mucosa thus marked out is

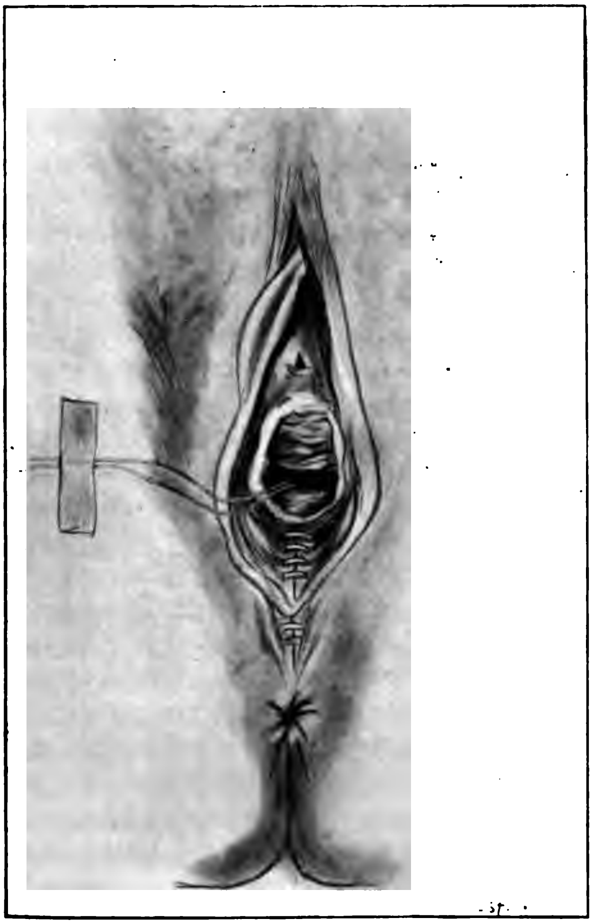


FIG. 33.—To the vaginal gauze a black-silk traction suture is attached to facilitate its removal.

dissected free, *except at its base*, and is turned down over the bowel orifice to protect the sutured ends of the sphincter from contamination. The dissection is facilitated by holding the rectovaginal septum forward with one or two gloved fingers passed within the rectum or by grasping the apex of the flap with ring forceps and separating it by blunt dissection in the line of cleavage.

Another sterile glove should be donned when the fingers are withdrawn from the rectum. Should the tear include the anterior rectal wall, the gap in the anterior rectal wall may be closed with fine silk or linen sutures passed through the muscular and submucous coats from the vaginal side and tied with their knots in the lumen of the rectum. Within the vagina the denudation is carried out as in incomplete lacerations. The ends of the sphincters are caught with tenacula, drawn out, and with Mayo dissecting scissors freed from surrounding adhesions. The internal sphincter is brought together with two buried figure-of-eight sutures of No. 1 chromic catgut. These are passed in planes parallel with the rectal wall, the first close to it, but not including it. The external sphincter ends are united with two or three buried interrupted sutures of No. 1 chromic catgut. These are reinforced by a retention suture of silkworm gut or silver wire, passed from the skin surface, just in front of the anus, going directly through the sphincter, about half an inch from the sphincter end. The remaining part of the wound is closed as in incomplete lacerations.

After-treatment.—Our best results have been obtained by keeping the bowels quiet for six or seven days, succeeding the operation. *No enemata should be given.* During this period of constipation the diet should be largely made up of meat soups, cereals, and vegetables.

Anterior Colporrhaphy for the Cure of Cystocele.—With the patient anesthetized and placed in the lithotomy position, a silk "guy-line" is placed in the anterior vaginal wall, just posterior to the urinary meatus, and the cervix is drawn down to the vaginal orifice in the axis of the vagina with traction forceps. This puts the anterior vaginal wall upon the stretch, making a longitudinal fold between the two fixed points.

This longitudinal fold of mucosa just in front of the cervix is caught up between tissue forceps and cut transversely with the scissors entirely through the vaginal wall. Blunt-pointed scissors curved on the flat are pushed up through the incision between the vagina and bladder wall to a point just posterior to the meatus urethræ. By spreading the blades the bladder is detached laterally from the vaginal wall. The anterior wall is now split with the scissors from the cervix to within a half inch of the meatus. The edges of the incision are seized with "ring forceps" and lateral traction made upon the mucosa which everts it, while the bladder is pushed off from the vaginal wall in the line of cleavage by blunt dissection with the thumb covered with sterile gauze, until it is freed laterally to a point behind the ischiopubic rami.

The bladder is then separated from the front of the uterus by sponge or blunt dissection to a line well above the isthmus of the uterus, and stripped from the anterior face of the broad ligaments. The base of the freed bladder is drawn taut and attached by three sutures (iodized gut) to the front of the uterus and broad ligaments at the upper limit of its separation. The redundant portion of the vaginal wall is now cut away with curved scissors (the extent of the lateral resection is dependent on the degree of relaxation of the vaginal wall) while the uterine end of the incision is extended on each side of the cervix through the mucous and submucous structures to the underlying fascial structures attached to the lower edge of the broad ligaments. The sutures are placed as follows: With the cervix held well back in the hollow of the sacrum, two silkworm-gut or silver-wire sutures are introduced through the mucosa and fascia at the base of one broad ligament, under the denuded area in front of the cervix, and emerge through the fascia and mucosa at the base of the other broad ligament.

The upper end of the vaginal wall is thus securely attached to the bases of the broad ligaments and drawn in front of the cervix, which is forced backward toward the sacrum. The remaining sutures unite the edges of the vaginal flaps, care being taken to introduce each suture far enough from the edge of the incision to grasp the underlying fascial structures, or a continuous buried suture of iodized gut may be used to unite the fascia, and interrupted chromic gut employed to close the incision in the mucosa. The success of an anterior colporrhaphy depends (1) on freeing the bladder from its vaginal, uterine, and broad ligament attachments;

(2) on raising the bladder base to a higher plane, and retaining it in this position by properly placed sutures; (3) on carrying the fascial structures in the base of the broad ligament in front of the cervix, which draws the cervix upward and backward; and finally on restoration of the vesicovaginal fascial plate by proper suturing. Bissell has suggested that the flaps be lapped over one another after first denuding one side of its overlying mucosa and secured in this position with a double line of mattress sutures. This gives a stronger fascial support.

CHAPTER VII.

GENITAL FISTULÆ.

A FISTULA is an abnormal opening between two natural cavities of the body or leading from one of the natural cavities to the outer surface of the body. There are two general classes of genital fistulæ:

1. Urinary fistulæ.
2. Fecal fistulæ.

The urinary fistulæ which commonly come under the observation of the gynecologist are those abnormal openings leading from some portion of the urinary tract into some point in the genital tract, *i. e.*, (1) *Vesicovaginal,* where there is a communication between the bladder and the vagina; (2) *urethrovaginal,* between the urethra and the vagina; (3) *vesicouterovaginal,* where the fistulous tract passes through the bladder and uterus into the vagina; (4) *vesicouterine,* where the false passage is between the bladder and uterus; (5) *ureterovaginal,* where the ureter communicates directly with the vaginal tube; (6) *ureterouterine,* where the abnormal opening is between the ureter and the uterus.

Vesicovaginal Fistulæ.—In this variety the abnormal opening is in the vesicovaginal septum, and there is a direct communication between the bladder and the vagina. The opening varies greatly in shape, size and location. It may be a mere pinhole or involve the entire base of the bladder. It may be situated in any part of the vesicovaginal septum, and is usually oval or irregular in shape.

All fistulæ between the bladder and vagina gradually contract and tend to close by granulation and cicatrization; spontaneous closure depends on the location and extent of tissue destruction. *The higher the fistula the greater its tendency to close spontaneously.*

Causes.—The causes are direct laceration occurring in the course of operative procedure, or protracted labor, producing necrosis in the vesical tissues, due to pressure on the bladder by the impacted head against the pubis. Extension of malignant disease of the cervix and vagina may cause sloughing of the vesicovaginal septum and produce urinary incontinence or the fistula may be produced artificially for drainage in cases of intractable cystitis. Operative injuries are probably the most common cause. The properly timed use of the obstetric forceps tends to avert injury to the bladder rather than produce it. It is when the advancing head is arrested and becomes impacted in the cavity of the pelvis that the most serious sloughs may be expected.

Symptoms and Physical Signs.—The symptoms are partial or complete leakage of urine into the vagina which results in constant dribbling from the vagina and produces excoriation of the vulva and surrounding skin surfaces.

The inner surfaces of the thighs may become inflamed, edematous, and excoriated and phosphatic incrustations may line the vaginal tube.

The opening may be so large as to allow eversion of the mucosa and protrusion of the mucous membrane of the bladder into the vagina.

Cystitis, ureteritis, and ureteropyelitis are complications which may cause the patient much vesical annoyance.

Small fistulæ may be located by the finger in the vagina and a sound passed into the bladder, or by the injection of sterile milk or some colored liquid (methylene blue) into the bladder which may be seen escaping by placing the patient in the Sims' position and retracting the perineum with a Sims' speculum thus exposing the anterior vaginal wall.

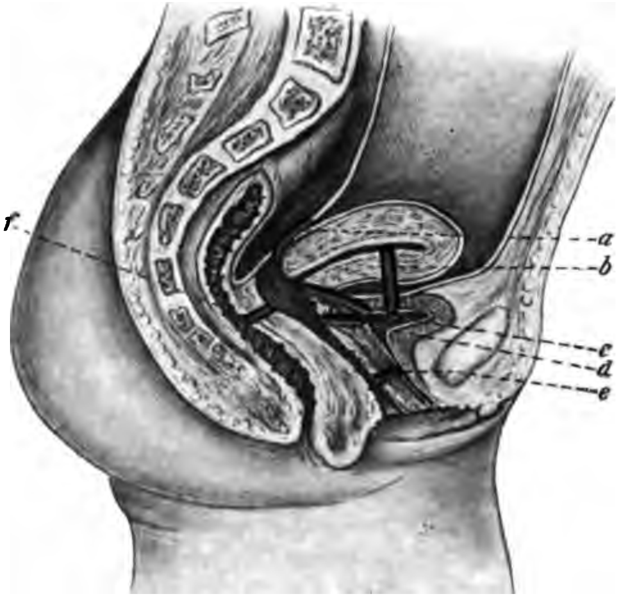
The extent and character of the scar tissue as well as the size and shape of the fistula may be demonstrated by inspection or by digital exploration of the vagina.

The bladder and urethra tend to become contracted from disuse, and infiltration of their walls is appreciable on palpation.

Prognosis.—The prognosis varies with the extent and location of the fistula. *Recent traumatic fistulæ tend to close spontaneously,* although minute sinuses may remain patent for years.

The operative prognosis is generally good except in malignant disease, or where the loss of tissue is extensive, or where the fistulous opening is firmly adherent to the pubic bones.

PLATE VI



Genital Fistulæ.

a. Ureterovaginal.	*d.* Vesicovaginal.
b. Vesico-uterine.	*e.* Urethrovaginal.
c. Vesico-uterovaginal.	*f.* Rectovaginal.

Treatment.—The treatment of vesicovaginal fistula should be considered under two heads: (1) The management of recent cases; and (2) that of chronic cases. In recent cases *cleanliness and time* are important factors in bringing about spontaneous closure. When the injury is the result of prolonged pressure during labor, or caused by extensive lacerations with the forceps, the tissues are so traumatized that several months should elapse before surgical repair can be considered. During this period of inaction the urine must be *rendered slightly acid to prevent* the formation of phosphatic deposits, by the administration of the benzoate of soda grain x to xx with boric acid, or the benzoate of ammonium grain x every two hours, or hexamethylenamin (urotropin) grain v to x every four hours in a goblet of water. The ingestion of plenty of pure water is imperative in order to dilute the urine. The vagina should be irrigated three or four times daily with copious douches of hot boric acid, while vesical irrigations through the urethra with warm boric acid ʒj to Oj, cleanse the vesical mucosa and allay the tendency to cystitis. Raw surfaces in the vagina may be touched with a 2 per cent solution of argentic nitrate. Tonics and hygienic measures to improve the general health, contribute largely to the woman's ability to regenerate healthy tissue.

Small fistulæ treated in this way rapidly diminish in size and frequently through the use of a retention catheter (of the Skene-Bigelow or mushroom type) close spontaneously. When such a fortunate result *does not* take place the parts are placed in the best possible condition for operative closure.

Chronic Fistulæ.—(Operation for small or medium-sized fistulæ.)—Before operating on any chronic vesicovaginal fistula, a course of preparatory treatment is generally required. The objects of the preoperative care are: (1) To remove the phosphatic deposits; (2) to heal the vaginal excoriations thus produced; (3) to soften the tissues immediately about the fistula; (4) to cure the associated cystitis; (5) to improve the condition of the patient's general health.

These ends may be accomplished by rendering the urine slightly acid, by the administration of sodium benzoate, and the use of hot boric acid douches. Excoriations are healed by applying a 2 per cent solution of nitrate of silver to the abrasion, while the edges of the fistula may be softened and their consistency changed by the frequent use of hot mild antiseptic douches and daily sitz-baths.

Vesical irrigation through the urethra does much toward relieving the associated cystitis; while tonics, fresh air, and a full mixed diet improve the woman's general condition.

Operative Technic.—With the patient anesthetized and placed in the Sims' or lithotomy posture, the fistula is exposed with perineal and lateral retractors, the cervix is caught and held well back while we determine the easiest direction of tissue coaptation with the tenacula. The edges of the fistula are caught with tenacula at opposite points and draw together, if possible, in a line corresponding with the long axis of the vagina. *If the edges can be easily approximated without tension*, a broadly bevelled denudation is made on the vaginal surface, avoiding the vesical mucosa. (The position of the ureter should be accurately known.) The area first outlined with the knife should extend in elliptical form well beyond the fistula (Figs. 34 and 35). When the denudation is completed silkworm-gut or preferably fine silver-wire sutures are placed one-eighth of an inch from the wound, and about one-sixth of an inch apart, these sutures are passed through vaginal mucosa and the muscular wall of the bladder falling short of the vesical mucosa. Before tying the sutures the bladder should be irrigated with a warm boric acid solution, and the denuded edges sponged dry. Care must be taken to secure perfect coaptation without constriction, as otherwise sloughing may defeat the success of the operation. The after-treatment consists in placing a light iodoform-gauze pack in the vagina for two or three days and avoiding vesical distention and tension on the sutured wound by securing proper urinary drainage for a week with a silver retention catheter (Skene-Bigelow type). The urine is kept acid with urotropin and sodium benzoate, and the bowels are opened on the third day. The stitches are removed in two weeks and the patient allowed out of bed.

The author has found that both large and small fistulæ heal with greater certainty *when the bladder is dissected free of* the vesicovaginal septum, and the bladder flaps sutured separately with iodized or fine chromic gut, bringing the raw flat surfaces in contact.

The sutures do not penetrate the vesical mucosa, hence this makes the edges of the bladder flaps form a welt projecting into the bladder.

The vaginal wall is closed separately in a similar manner. Fistulæ high up on the anterior vaginal wall may be brought into the operative field by lateral division of the pelvic floor or by operating with

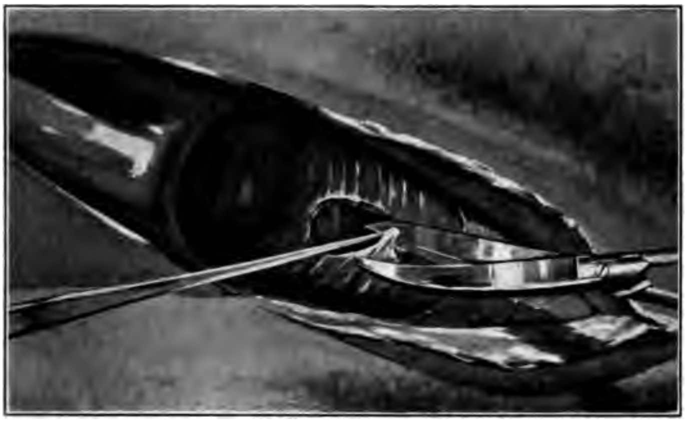


FIG. 34.—Paring the edge of the fistula.

the patient lying on her abdomen in the Bozeman position with her thighs hanging over the edge of the table as suggested by Ward

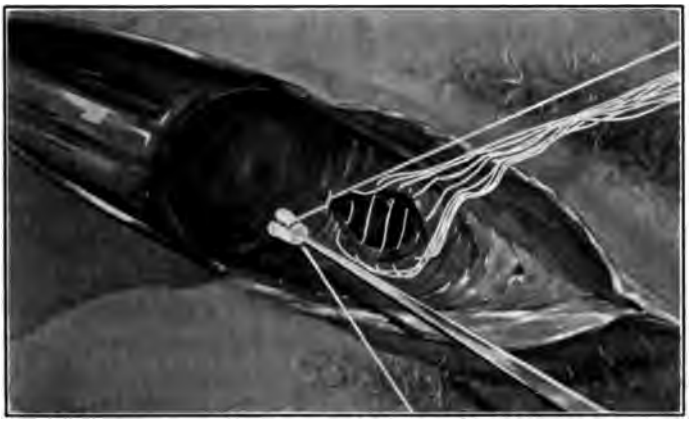


FIG. 35.—Tying the sutures.

Occasionally it may be necessary to close the bladder opening through a suprapubic incision. This means of access is specially valuable when the fistula is high up on the posterior bladder wall.

A retention catheter in the urethra and a suprapubic drain in the lower end of the abdominal wound takes care of the drainage and leakage.

Urethrovaginal Fistulæ.—A urethrovaginal fistula is an abnormal opening between the urethra and the vagina. When the injury is near the vesicourethral junction or involves the sphincter vesicæ muscle, the patient will complain of incontinence, usually, however, *the only symptom is the escape of urine into* the vagina during micturition.

On physical examination a sound may be passed through the opening on the floor of the urethra into the vagina.

Treatment.—Fistulæ of the urethra may be closed in a similar manner to those of the bladder, except that the suturing is done over a metal catheter in order that the lumen of the urethra may be preserved.

Vesicouterine Fistulæ.—Vesicouterine fistulæ are caused by anterior lacerations of the cervix and lower uterine segment during labor, which extend into the bladder. The lower portion of the cervical canal may heal spontaneously and leave a fistulous track from the bladder into the cavity of the uterus, which allows the urine to escape through the cervical canal.

Diagnosis.—The diagnosis is made on the leakage of urine through the cervical canal, which may be demonstrated by placing the patient in Sims' position; exposing the cervix with a Sims' speculum, and injecting sterile milk or a sterile solution of methylene blue into the bladder to distend it; the *test-solution* may be seen escaping from the cervix, or a fine probe may be passed through the cervical canal into the bladder, or direct inspection of the bladder may demonstrate the location of the fistula.

Treatment.—Spontaneous closure of a fistula in this location is exceptional. It is usually necessary to separate the bladder from the vagina and the anterior uterine wall for a short distance above the fistulous opening, the edges of which are excised and the bladder and uterine wounds closed separately with interrupted sutures, turning the edges of the mucosa into the bladder; or the suprapubic route may be chosen. In which case the vesicouterine fold is split and lifted off the front of the uterus by blunt dissection, exposing the vesical opening. This is dissected free from the uterus and closed. The track into the uterus is then excised and closed with buried sutures, and the peritoneal bladder flap reunited with the peritoneal covering on the front of the uterus, which makes the repaired structures extraperitoneal.

Ureterovaginal Fistula.—A ureterovaginal fistula is an abnormal communication between one of the ureters and the vagina. It is most commonly the result of injury to the ureter during operation. There is usually no difficulty in making the diagnosis. The continuous dribbling of urine from the vagina, the diminished amount of urine eliminated *via* the bladder, the absence of vesical leakage when the bladder is distended with colored fluids, and the inability to catheterize both ureters, confirm the suspicion that the ureter has been injured.

Treatment.—Treatment usually consists in the implantation of the lower end of the upper segment of the ureter into the bladder, by either the vaginal or abdominal route. Ureteroureteral anastomosis is more difficult and is seldom employed as the proximal end of the ureter is usually lost in the scar tissue and exudate, or if infection of the ureter or kidney has taken place, which unfortunately is a common complication of this accident, it may be necessary to remove the kidney and ureter.

Rectovaginal Fistula. — In this variety of fistula there is an abnormal opening between the rectum and the vagina which may be located at any point in the rectovaginal septum. It is usually due (1) to injuries sustained during childbirth; (2) to injury to the bowel during perineal operations (3) to imperfect union of the anterior rectal wall following repair of tears extending through the sphincter into the rectum; (4) to malignant extension into the rectum in cancerous disease of the cervix; (5) to ulceration of the rectovaginal septum from the pressure of an ill-fitting pessary; (6) to penetrating wounds from external violence. Occasionally a perirectal abscess may rupture into both the rectum and the vagina, establishing a tortuous connection between these two canals.

Diagnosis.—The diagnosis is made on the escape of feces and flatus by way of the vagina, the amount of annoyance caused by this accident depends largely on the size of the fistula. Larger openings allow fecal incontinence and cause an irritative vaginitis and vulvitis owing to the constant presence of fecal discharges. On the other hand, a small fistula may not allow the passage of solid feces, but the constant passage of flatus and a purulent fecal discharge may prevent the patient from appearing in society.

Physical Examination.—Digital exploration readily reveals the position of large fistulæ, as the tip of the finger may be passed through the opening into the rectum. The location of small fistulæ is often more difficult to determine. This, however, may be demonstrated by exposing the vagina with a trivalve speculum, and distending the rectum with milk, and observing the point in the vagina at which the milk escapes, or its course may be determined by passing a fine probe through the vaginal opening with the gloved finger in the rectum as a guide.

Treatment.—The treatment of recent cases includes the complete evacuation and cleansing of the lower bowel with enemata, and the frequent irrigation of the vagina with mild antiseptic douches. Time and cleanliness accomplish the spontaneous closure of the fistula in a small proportion of recent cases, or at least reduce the size of the rectovaginal opening. The sinus may be stimulated by application of weak solutions of silver nitrate. The great majority of rectovaginal fistulæ will demand the employment of surgical methods to accomplish a cure.

Treatment of Operable Cases.—Seventy-two hours before the operation the intestinal tract is emptied by the administration of 1 ounce of oleum recini given with 10 grains of menthol and 2 drams of paregoric to relieve the colic produced by the oil. This is followed by an enema and cleansing of the lower bowel with a warm boric acid irrigation. Under *general anesthesia the anal sphincter is thoroughly stretched*, and an *iodoform gauze pack is placed in* the rectum above the fistula. The vagina is swabbed with half-strength tincture of iodine to further sterilize the operative field, and a funnel-shaped denudation of the edges of the fistula is made on the vaginal side. Fine silkworm-gut or silver-wire sutures are introduced at intervals of one-eighth of an inch through the length of the rectovaginal opening, falling short of the rectal mucosa. When all of the sutures are placed, the wound edges are carefully dried and the sutures tied, approximating the bevelled edges. The rectal pack is removed and rubber tube is passed into the rectum well beyond the fistula and held in place with a suture at the anus while a loose iodoform-gauze tampon is inserted in the vaginal canal. In the presence of much cicatricial tissue it may be necessary to dissect up the vagina from the rectal wall for an inch or more around the fistula, and suture the rent in the rectum with interrupted fine-silk sutures, passing through the rectal wall, including the muscularis, submucosa, and mucosa, everting the latter, and approximating the muscular flaps by tying the sutüres in the rectum. The vaginal flaps are closed with a few sutures of fine silkworm gut.

Rarely, in fistulæ close to the anal sphincter, it may be necessary to divide the entire rectovaginal septum below the fistula, and then denude the fistulous tract and proceed as for the repair of a complete tear of the pelvic floor.

In a fistula through the sphincter—an anovaginal fistula or rectoperineal fistula—it is generally best to lay open the tract through its entire length by dividing the lower sphincter fibers, below the fistula, and carefully excise the entire tract. When this is done the wound may be closed with *interrupted non-absorbable sutures.* The technic may be varied to suit the needs of the individual case.

After Care.—The vaginal tampon is removed at the end of forty-eight hours and not replaced. A short hard rubber rectal syringe tip may be left in the anus, or a large rectal tube may be carried beyond the fistula into the sigmoid and kept *in situ* to allow for the escape of flatus, thus preventing distention of the gut.

Enemata should be prohibited. The bowels may be moved after forty-eight hours with compound licorice powder or a mild saline laxative. The sutures are removed on the tenth or twelfth day, and the patient allowed out of bed in two weeks.

CHAPTER VIII.

DISEASES OF THE UTERUS.

DEVELOPMENTAL ANOMALIES.

ANOMALIES in development of the uterus arise either from imperfect development during infancy or from imperfect blending or fusion of the lower portions of Müller's ducts during the prenatal state. The Müllerian ducts are at first solid strands, throughout their entire length, except for the hollowed out upper extremity, later lumina develop in these strands and they join one another at the situ of the future cervix, this fusion is followed by union of the two ducts as far as the fundus and then the intervening septa slowly disappear leaving a flattened top uterus, but at the end of intrauterine life a fundus has developed; any arrest in these successive steps results in anomaly, complete failure of both Müllerian ducts to develop is found only in monstrosities.

The following uterine malformations have been described:

1. Rudimentary uterus.
2. Double uterus—uterus didelphys.
3. Bicornate uterus—uterus bicornis.
4. Septate uterus—uterus septus.
5. Uterus unicornis.
6. Infantile uterus.

Rudimentary Uterus.—The arrest takes place in development during the first month of fetal life, when the Müllerian ducts are still solid cords of cells. The *uterus and tubes* are represented by a transverse band of dense tissue. The ovaries if present are as a rule, very small (Fig. 36).

Double Uterus.—*Uterus Didelphys* or *Uterus Duplex*, is a bifid uterus resulting from a failure of union in those portions of the Müllerian ducts which normally coalesce to form a single uterus.

Each lateral half has but one cornu, one tube, one ovary, one round ligament, and one broad ligament. The two cervices may open into a single vagina or into separate vaginæ. One-half may be imperfectly developed or imperforate, yet functionally active, in which case a hematometra is developed. Menstruation may be normal and pregnancy occur in one or both uteri at the same time, while labor may be uncomplicated and without accident or the delivery may be blocked by the non-pregnant half of the uterus becoming incarcerated in the pelvis in front of the advancing fetus—making infrapelvic delivery impossible.

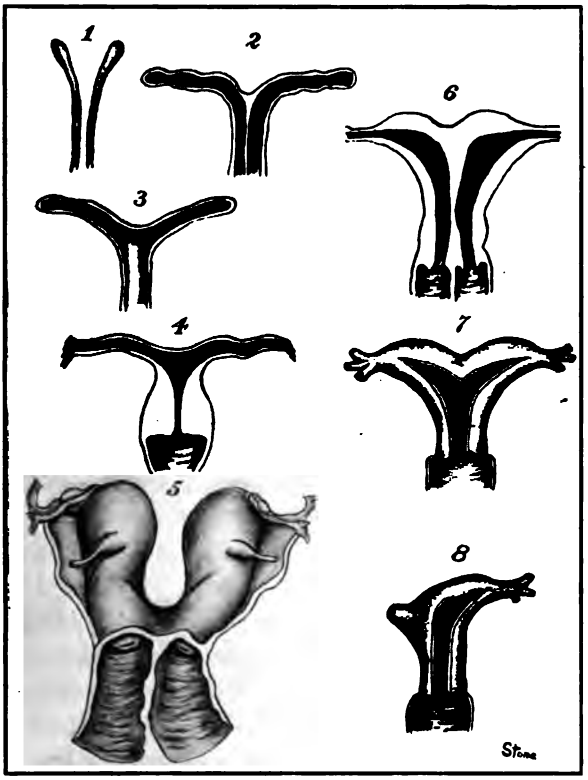


FIG. 36.—1, Müller's tubules; 2, coalescence of Müller's tubes; 3, rudimentary uterus; 4, infantile or fetal uterus; 5, uterus duplex—didelphys; 6, uterus septus; 7, uterus bicornis; 8, uterus unicornis.

Bicornate Uterus (*Uterus Bicornis*—Fig. 36).—In this anomaly the lateral halves of the uterus *are distinct above*, while the lower part of the body and cervix are united. Fusion of Müller's ducts has failed above, but is more or less complete in the lower portion of the uterus.

Failure or fusion may be limited to the fundus, indicated by a more or less well-defined notch on the fundus, or the duplicity may extend to the cervix. The development of the two horns may be asymmetric, and the cervix may be divided by a median septum.

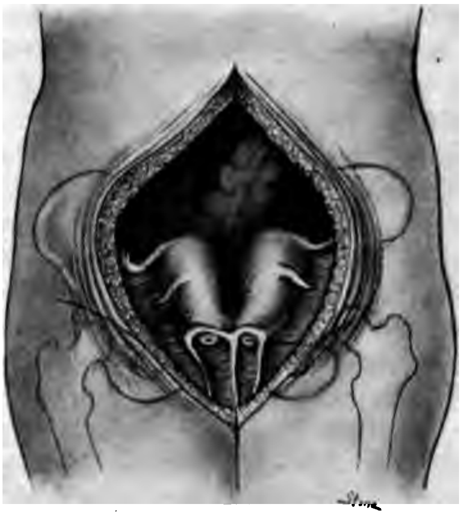


FIG. 37.—Diagrammatic drawing of author's case of double uterus, with a six weeks' pregnancy in the left half of the uterus.

Uterus Septus or Septate Uterus (Fig. 36).—In this form of anomaly the uterine cavity is completely divided into two lateral cavities by a median septum resulting from the persistence wholly or in part of the fused walls of the united Müllerian ducts. When the septum is incomplete, dividing only a part of the uterine cavity it is called a *uterus subseptus*.

The contour of the uterus betrays nothing abnormal externally. Both lateral divisions may be functionally competent, and childbirth may occur without complication unless the placental attachment is to the septum, when serious postpartum hemorrhage may ensue. The septate uterus may be associated with a single or double vagina.

Uterus Unicornis (*the One-horned Uterus*).—In this malformation one horn of the uterus is either absent or rudimentary. The corresponding tube, ovary, round ligament, ureter and kidney also may be rudimentary or absent. This is due to an arrest in the development of one Müllerian duct, while the other has gone on in the development of a fleshy wall, uterine glands, endometrium, etc. (Fig. 36). The rudimentary horn may be imperforate or solid and a hemotometra or ectopic pregnancy may occur in the imperfect horn. The developed horn of the anomaly, however, is not incompatible with normal menstruation or pregnancy, although it is sometimes difficult to differentiate pregnancy in a uterus unicornis from an apicial or ectopic gestation. Pregnancy in such a uterus can go to term or may terminate in uterine rupture, abortion, or premature labor.

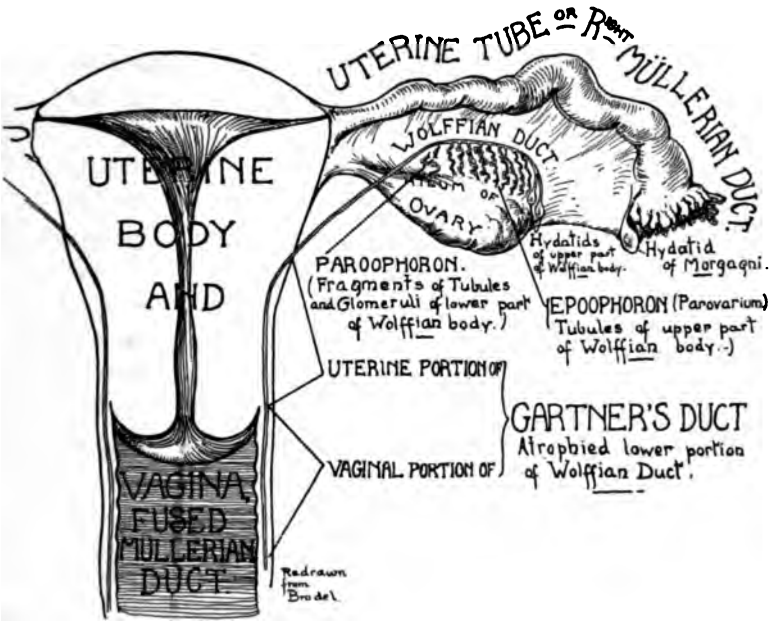

UTERINE TUBE OR RIGHT MÜLLERIAN DUCT.
WOLFFIAN DUCT
OF OVARY.
UTERINE BODY AND
Hydatids of upper part of Wolffian body.
Hydatid of Morgagni.
PAROOPHORON. (Fragments of Tubules and Glomeruli of lower part of Wolffian body.)
EPOOPHORON (Parovarium) Tubules of upper part of Wolffian body.)
UTERINE PORTION OF
VAGINAL PORTION OF
GARTNER'S DUCT
Atrophied lower portion of Wolffian Duct.
VAGINA, FUSED MÜLLERIAN DUCT.
Redrawn from Brodel

FIG. 38.—Schematic drawing showing the relations of the Müllerian, Wolffian and Gärtner's ducts to the developed uterus and ovaries.

Infantile Uterus (*Fetal Uterus*) is an undeveloped or fetal uterus of a small size and cylindrical form with a flattened fundus. The cervix may be equal to or two or three times the length of the body, which is in acute anteflexion, or both cervix and body may be abnormally small. This form of uterus is usually associated with other developmental defects, as funnel pelvis, narrow vagina and undeveloped ovaries. Menstruation rarely occurs or may be associated with severe dysmenorrhea, and sexual desire is generally absent. Pregnancy is seldom possible. The external genitals may be poorly or be normally developed. It usually occurs in women who are otherwise ill developed.

Other anomalies are: An accessory uterus which lies in front of the normal uterus, possibly due to a diverticulum of Müller's duct, and absence of the uterus, which is very rare, partial or complete absence of the portio vaginalis or congenital flexion or retroversion and prolapse in the nullipara.

THE NORMAL POSITION OF THE UTERUS.

The normal uterus is a freely movable organ and is suspended in the pelvis between the abdominal cavity and the pelvic floor by the harmonious action of its several supports, *i. e.*:

1. The pelvic floor.
2. The adjacent pelvic organs.
3. The retentive power of the abdominal cavity.
4. The several ligaments.
5. By the normal relation which the uterine axis bears to the axis of the vagina.

In the erect posture of the woman, bladder and rectum being empty, the os externum is in the plane of the *ischial spines*, or a little below it and slightly posterior to a central position in the pelvis. The cervix projects into the vagina, and is directed toward the last sacral vertebra, and is held in this position by the uteropelvic and the uterosacral ligaments and the vesicovaginal fascial plate.

The upper and posterior aspect of the fundus is at or a little above the level of the plane of the brim. The axis of the uterus is at nearly an acute angle with that of the vagina, *the body* resting on the pubic (fascial) shelf.

The axis of the uterus has a wide range of inclination, dependent upon the degree of fullness of the bladder and rectum. With bladder and rectum moderately full, the uterine axis conforms with the axis of the pelvis. With the bladder empty the axis of the vagina is almost horizontal, and runs almost directly backward, while the uterus is directed forward at an acute angle and is in a position of marked anteversion, slightly anteflexed. The attachments of the uterus are for the most part of a yielding character, which allows of great freedom of motion in all directions, rising and falling with the respiratory movements and changing its position with the different positions of the body.

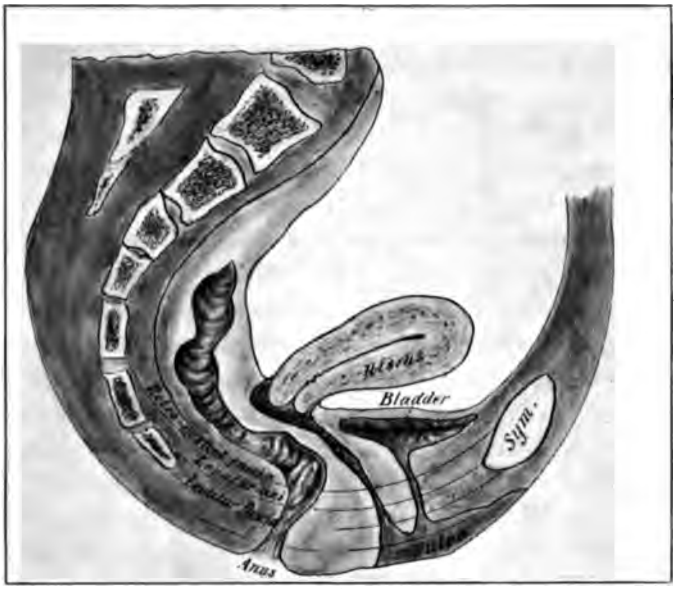


Fig. 39.—Normal position of the uterus, showing the pelvic diaphragm, bladder and rectum empty. (Dickinson.)

A full rectum pushes the uterus bodily forward and a full bladder displaces it backward.

The ligamentous supports of the uterus are:

The *round ligaments*, muscular bands covered with peritoneum, which tend to hold the fundus forward, acting as stays or "guy ropes" to prevent it from falling backward.

The uteropelvic ligaments, which consist of bands of muscle fibers running outward from the supravaginal portion of the cervix to the pelvic fascia within the base of each broad ligament. They prevent the uterus from undergoing lateral changes in position and help to sustain it in its proper plane.

The *broad ligaments,* which act in some measure to steady the uterus in or near the median section of the pelvis are lateral continuations of the reflection of the peritoneum which is thrown over the uterine body and fundus running outward to lateral parallel walls.

The *uterosacral ligaments,* made up of muscle and cellular tissue and covered with peritoneum, pull the cervix upward and backward and prevent its downward displacement.

The *pelvic floor, which preserves the position and integrity of all of the organs and soft parts of the pelvis, indirectly supports the uterus.* The pelvic floor, the uterosacral ligaments, and the uteropelvic ligaments are the chief supports against *downward displacement.*

DISPLACEMENTS OF THE UTERUS.

The uterus may be displaced as a whole, the entire uterus changing its position in the pelvic cavity and its relation to the neighboring organs. 1. It may ascend, descend, or be pushed or pulled backward into retroposition or forward into anteposition, or may be moved toward one or the other lateral pelvic wall into lateroposition. (Fig. 40).

2. It may change its position by an alteration in the relation of its axis, as *in versions,* where the long axis of the uterus has changed its normal relation to the axis of the vagina. Illustrated by anteversion, retroversion, and lateral version. (Figs. 41, 42).

3. Or the uterus *may be bent in its long axis,* flexed upon itself, which destroys the normal curve of the uterine canal, an alteration in the relative position of the body and cervix. Thus we may have anteflexion, retroflexion, lateroflexion. (Figs. 43, 44).

4. The uterus may be turned upon its long axis, so that one side is more anterior than the other. This is termed *uterine torsion.*

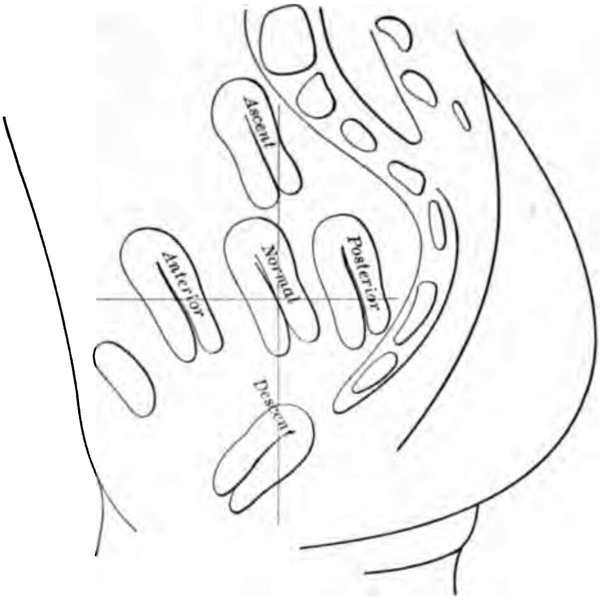


Fig. 40.—Diagram showing uterus displaced as a whole.

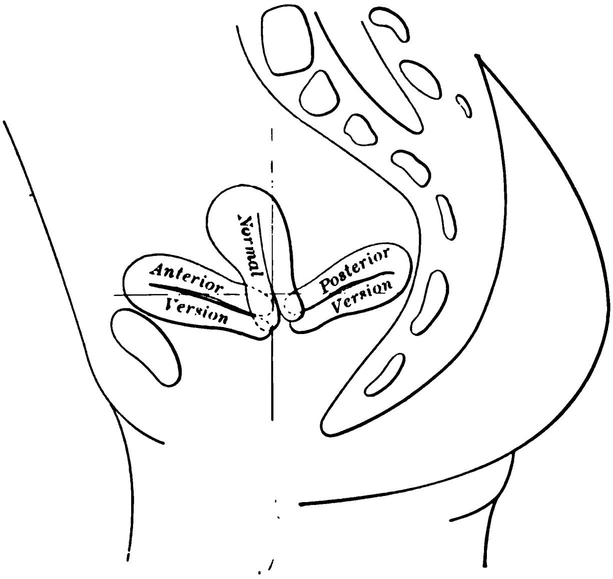


Fig. 41.—The long axis of the uterus has changed its normal relation to the axis of the vagina—in anteversion and retroversion.

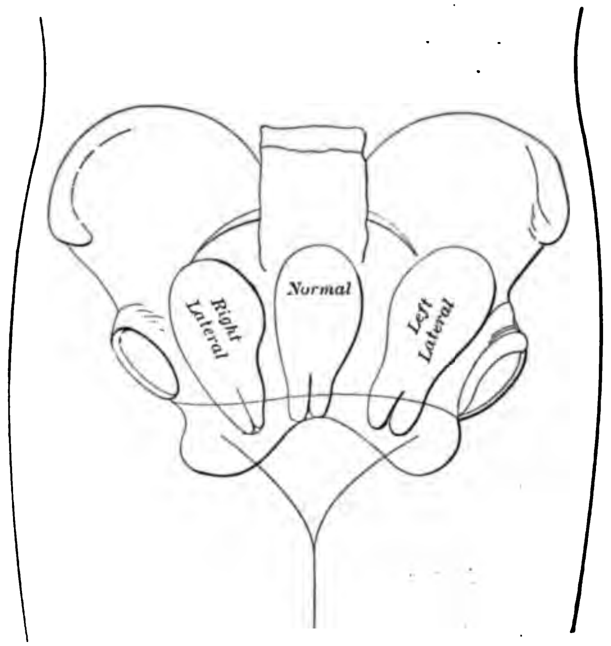


Fig. 42.—Lateral versions.

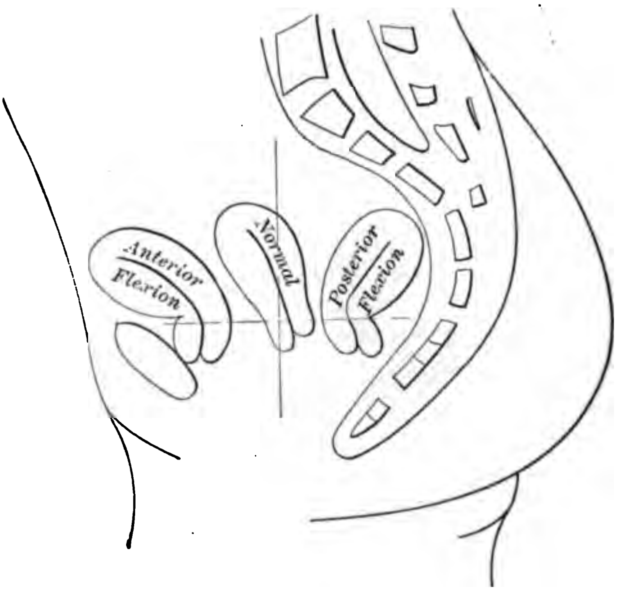


Fig. 43.—Position of uterus changed by being bent in its long axis—in anterior and posterior flexions.

In pregnancy the uterus is turned in its long axis toward the right, or the uterus may be turned inside out, when it is known as *inversion*.

Ascent (*elevatio uteri*) may be caused by shortening of the utero-sacral ligaments, or by the upward traction or upward pressure of tumors, by pregnancy, or by enlargement owing to the growth of a uterine tumor beyond the capacity of the *pelvis* to *contain* it.

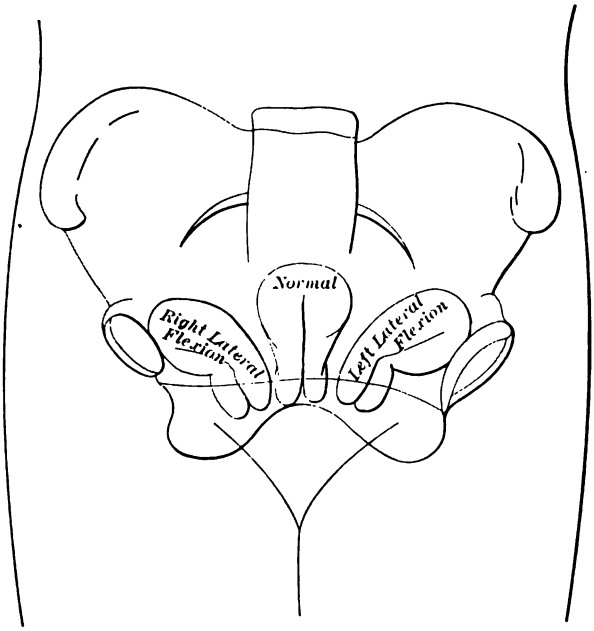


Fig. 44.—Lateroflexions.

Anteposition.—The entire uterus is moved forward toward the pubis, lying immediately behind the symphysis. This displacement is caused by tumors behind the uterus in the cul-de-sac, pushing it forward, as a pelvic hematocele, tubal and ovarian swellings, cervical myoma, or pelvic abscess. Anteposition is often combined with ascent.

Retroposition.—Retroposition, or where the uterus lies back as a whole in the pelvis, may result from posterior peritoneal adhesions or from tumors in front of the uterus. More or less downward disdisplacement is usually associated with retroposition.

Lateral Displacement, or lateroposition, may arise from traction of scar tissue in one broad ligament, or from the pressure of intraligamentous growths. It is sometimes congenital.

Infections through postpartum cervical injuries result in parametric exudates at the sides of the uterus, which when large, will crowd the organ over to the opposite side of the pelvis, while later when the exudate organizes and contracts, the uterus is drawn to the side formerly occupied by the exudate.

Ascent, anteposition, retroposition, and lateral displacement are of importance only by reason of the causal affections, therefore the *treatment of each is the treatment of the cause.*

Anteversion of the Uterus.—In anteversion there is an excessive forward inclination of the uterus, and straightening of the uterine axis, so that the cervix points more directly backward.

The condition has no pathological importance *per se.*

The physiological anteversion may be exaggerated by chronic metritis or changed to an anteflexion of the body by the weight of tumors in the uterine corpus or from pressure of tumors behind it, sometimes by retrouterine cellulitis and peritonitis.

The anteflexed anteversion of the normal uterus is increased in early pregnancy. *As a rule no treatment is required.*

Anteflexion of the Uterus.—Anteflexion is an excessive forward flexion of the body of the uterus, or of the cervix and body an exaggeration of the normal anteflexed-anteversion. The usual seat of flexion is at the upper portion of the cervix or at its junction with the body. It may be congenital or acquired. The forward flexion may pertain to the cervix or to the body, or to both cervix and body. The cervix may be bent so sharply forward that it lies in the axis of the vagina and forms a distinct right angle with the body, or the uterus may be sharply bent on itself by forward flexion of both cervix and body, that the fundus and cervix are lying at an acute angle with each other. It occurs most frequently in nulliparous women.

Causes.—In congenital anteflexion, the invagination of the cervix is faulty, the anterior vaginal wall shortened, the cervix long, conical, and the external os is excessively small, while the whole uterus and the other sexual organs are more or less imperfectly developed. This condition is often associated with a spastic contraction of the ligaments whereby the forward pull on the fundus by the round ligaments and the backward traction on the uterocervical junction by the uterosacrals produce an acute angle between the body and cervix.

Anteflexion is rare in child-bearing women. Acquired anteflexion is an exaggeration of the *anteflexed-anteversion* of the normal uterus, produced by inflammatory changes or tumor formation in the muscular structures of the body—as metritis or fibroids, which cause it to fall farther forward, a cellulitis of the uterosacral ligaments, may produce cicatricial contraction and draw the cervix upward and backward at the point of their attachment which throws the fundus forward, or to abnormal softening of the uterine walls at the point of flexion.

Anteflexion is of pathological importance only when it causes symptoms of dysmenorrhea, leucorrhea, and sterility.

Symptoms.—Dysmenorrhea dating from puberty and sterility after marriage are characteristic symptoms. On the other hand, anteflexion may exist for years and give no symptoms. The symptoms are the result of circulatory changes in an imperfectly developed uterine muscle containing an excessive amount of fibrous tissue, a passive hyperemia in the uterine muscle and connective tissue occurs which if continued year after year, produces a distinct pathology *i. e.*, a further increase in the amount of connective tissue in the uterus. *The dysmenorrhea is due to an obstruction* at the cervical canal produced by the flexion, and the swollen hypertrophied condition of the endometrium and underlying connective tissue which temporarily blocks the canal.

The leucorrhea, a hypersecretion of the uterine and cervical glands, is due to the obstructed circulation which produces a passive hyperemia. It is usually most severe just before and after the menstrual flow.

Dyspareunia.—Pain on sexual intercourse occasionally becomes a prominent symptom after marriage due to the tenderness provoked by movement of the cervix occasioned by the associated uterosacral cellulitis which results from cervical infection and pelvic congestion.

Sterility.—Sterility may be a symptom of long standing in anteflexions which are the seat of chronic metritis and endometritis, or in marked anteflexion, with excessive length of the cervix, which prevents the cervix from resting in the seminal lake.

Diagnosis.—The diagnosis is made by the vaginoabdominal touch. By bimanual palpation the entire uterus may be mapped out revealing the forward flexion of the body, which forms a right angle with the normally positioned cervix, or an acute angle with the deeply invaginated cervix lying in the axis of the vagina. The uterosacral ligaments are usually felt as tense, tender bands, and in the undeveloped type the whole uterus may be retroposited in the pelvis.

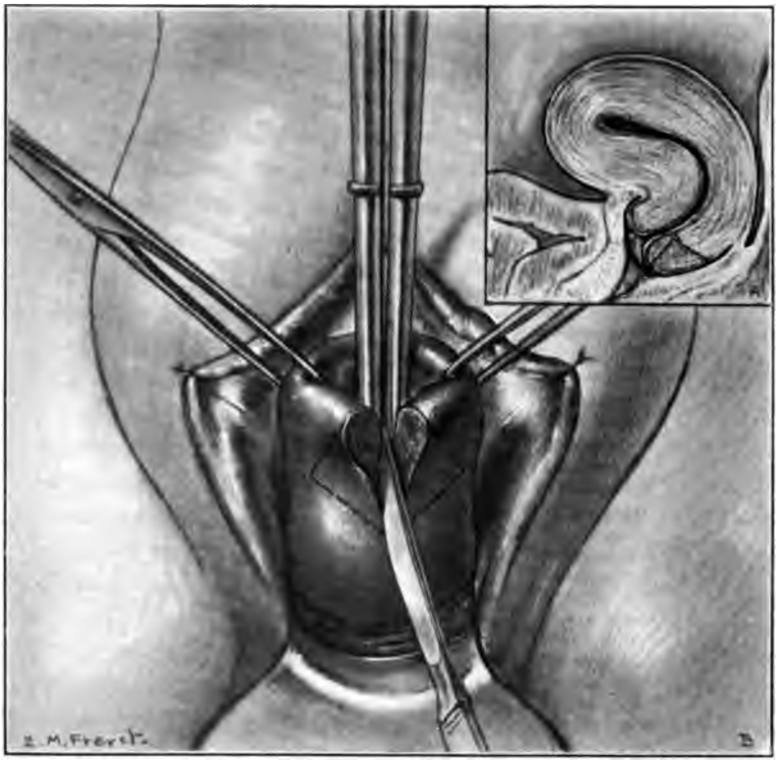


FIG. 45.—Dudley operation showing line of incision and area to be excised.

The condition must be distinguished from a tumor (myoma) of the anterior uterine wall, and from an exudate between the uterus and the bladder. The shape, size, and consistency of the uterus with the sound in the cavity will usually serve to distinguish the anteflexed uterus from other anterior swellings.

Treatment.—*Anteflexion, unless it produces symptoms, requires no treatment.*

Anteflexion associated with infantile uterus is often incurable, yet much relief from the dysmenorrhea may be afforded by the use of the galvanic current, an aseptic intrauterine electrode is introduced into the uterus for ten minute seances for several days before each menstrual period. The negative pole is introduced into the uterine cavity and the positive pole applied over the abdomen or sacrum. The strictest asepsis must be observed. *This method of treatment should not be used in virgins.*

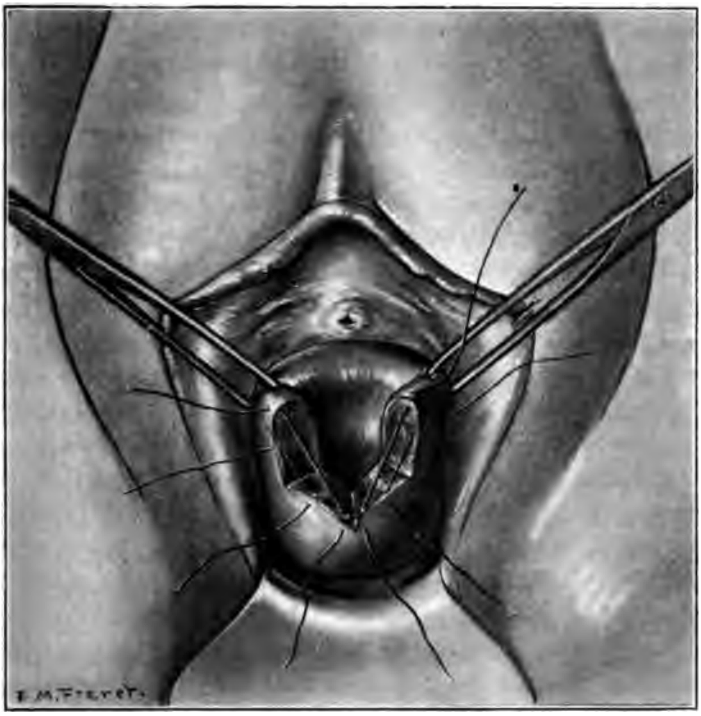


Fig. 46.—Dudley operation, sutures in place.

In pathological anteflexion with associated endocervicitis, endometritis and posterior parametritis much may be done to improve uterine drainage and establish a better balance in the uterine circulation, by cure of the endocervicitis by thorough dilatation and curettement of the uterine cavity, this should be followed by attention to the bowels, especially before each menstrual epoch, and the use of hot douches and boroglyceride tampons to relieve the uterine congestion during the intermenstrual period.

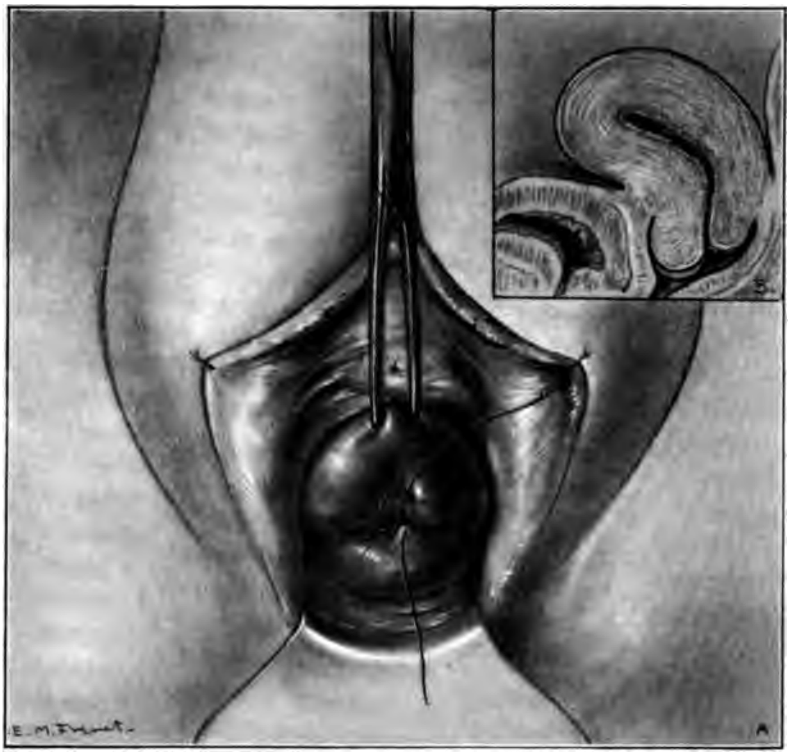


FIG. 47.—Dudley operation sutures tied, external os drawn backward.

When the vaginal portion of the cervix is long, and the body is acutely bent on the cervix, discission of the cervix after Dudley's method, combined with elongation of the anterior vaginal wall, after the manner of Reynolds, straightens the uterus and accomplishes drainage, changing the anteflexion into an anteversion, with the cervix pointing well back toward the sacrum.

In anteflexion of the body without associated endocervicitis or endometritis, the stem pessary of the Baldwin or Davenport type has a definite field. *A stem should never be used in a uterus which has been curetted, or in the presence of cervical infection or parametral or adnexal inflammation.*

Pregnancy going to the latter months usually effects a cure of the symptoms occasioned by the flexion. In conjunction with all forms of local treatment attention should be given to the improvement of the woman's general health by exercise, fresh air and a meat-free diet as it contributes to her general well being and often makes the menstruation less painful.

Technic of the Dudley Operation as Modified by the Author.—After a preliminary dilatation and curettage the cervix is drawn down by tenacula placed on each side of the os externum, and a Palmer dilator introduced into the cervical canal through the internal os (Fig. 45). With this held in place as a guide, the posterior lip of the cervix is divided with a knife in the median line to the vaginal junction, *through the internal os.*

The incision is held open by traction on the tenacula and a wedge-shaped piece is removed from each side (Fig. 46), and sutures are so introduced as to unite the edge or apex of the incision on each side with the base (Fig. 47), which brings the internal and external os into line at the posterior fornix.

Reynold's Method of Elongating the Anterior Vaginal Wall, and Freeing the Uterus from its Anterior Attachments.—The anterior lip of the cervix is seized with a volsellum and drawn strongly backward, putting the anterior vaginal wall strongly on the stretch. The vaginal wall is then divided transversely with the knife just in front of the cervix, the incision being usually wide enough to admit the index finger, and carried completely through the vaginal wall with knife and scissors, exposing the bladder. The finger is then passed into this cut and the bladder freed from the vagina and cervix and well up along the anterior surface of the uterus.

A similar blunt dissection with the finger separates the anterior attachments of the vault of the vagina and base of the bladder well out to each side. The lateral separation should be made extensive, and be carried well above the angle of flexion.

"The edges of the vaginal wound are then brought together by transverse sutures, nothing but the vaginal wall being included in their grasp, thus elongating the anterior vaginal wall and allowing the uterus to straighten itself."

Retroversion and Retroflexion of the Uterus.—*In retroversion the uterus is permanently inclined backward, with no deviation in the uterine axis.* The long axis of the uterus no longer forms a right angle with the vagina, but is coincident with the axis of the vagina.

In retroflexion the uterus bends backward upon itself; the fundus points posteriorly, while the cervix may remain in its normal position. The curve of the uterine canal is altered, its concavity looking backward.

Retroversion is usually associated with retroflexion and *some degree of descensus always coexists.*

Retrodisplacements are found in about 18 per cent of gynecological patients, and are more common in parous than in nulliparous women. The atrophied uterus after the menopause is usually displaced backward.

Retroversion may be (1) congenital or (2) acquired.

Retroflexion is always acquired.

Degrees of Retrodisplacement.—*First Degree.*—The fundus is directed toward the sacral promontory; the axis of the uterus coincides with the axis of the vagina.

Second Degree.—The uterus lies nearly horizontal in the pelvis and the fundus points toward the hollow of the sacrum.

Third Degree.—The fundus is below the level of the cervix and points toward the sacrococcygeal articulation.

Causes.—The commonest cause of retrodeviation of the uterus is the relaxed condition of the uterine supports in child-bearing women, following prolonged labor, operative traumatism, and neglected puerperia, these result in faulty involution of the uterus and its supports.

The associated descensus depends on the injury to fascial sheaths and the lengthening of the uterosacral ligaments which permits the cervix to slide forward in the axis of the vagina.

Other causes are: The traction of posterior adhesions dragging the fundus backward; a short anterior vaginal wall, pulling the cervix forward; increased weight of the uterus as in subinvolution or uterine tumors, with a long cervix and a short vagina; or forward flexion of the cervix in large pelvis with a relaxed pelvic floor, a tight obstetric binder crowding the pelvic organs downward, and neglected constipation while the woman is in bed, this in the puerperal period, occasions straining during defecation and drives the fecal column forward and downward against the posterior vaginal wall which tilts the cervix forward, while the intra-abdominal pressure crowds the fundus backward, this allows the intestinal coils to occupy the uterovesical space and the intra-abdominal pressure to exert its force on the anterior surface of the uterus.

Lacerations of the cervix predispose toward subinvolution and excessive weight of the uterus, while tears of the pelvic floor favor retrodisplacement by impairing the support of *all* the pelvic organs.

Retroflexion is comparatively rare in non-parous women.

The development of an acquired retrodisplacement with descensus is a gradual process.

Complications.—The complications of retrodisplacements are largely the result of interference with the pelvic circulation and faulty uterine drainage which in turn changes the pelvic tissues producing edema and cell proliferation, these are:

1. Prolapse of the tubes and ovaries, this results in chronic circulatory changes in the pelvis, as varicosities in the broad ligament, swelling, adhesion and microcystic changes in the ovaries.
2. Fixation of the uterus by the formation of posterior peritoneal adhesions.
3. Rectal obstruction from pressure of the fundus on the rectum, interfering with its lumen, and resulting in sacculation of the sigmoid, constipation, proctitis, and hemorrhoids.
4. Vesical irritability due to traction upon the neck of the bladder, distorting the shape of the urethrovesical opening.
5. Visceral ptosis due to the relaxation of the pelvic diaphragm, made up of the pelvic floor and fascial sheaths.
6. Complicating digestive disorders.

Symptoms.—Posterior displacements of the uterus *may be present without producing any subjective symptom.* This, however, *is not the rule,* for backward displacements of the uterus *in time always develop some local pathology,* or *local complications,* due to mechanical pressure and interference with the pelvic circulation which produce a definite train of pelvic and general symptoms.

1. Pelvic pain and tenesmus are more or less constant symptoms

in backward displacements. The patient complains of a feeling of weight or of a dragging sensation in the pelvis, which is aggravated by standing and relieved by lying down, and is usually more severe during the menstrual period, especially when the ovaries are prolapsed, owing to the increased weight of the swollen uterus.

2. Backache or lumbosacral pain, which is one of the most common symptoms, is due to the traction of the heavy uterus on the tender uterosacral ligaments, which are commonly the seat of an inflammatory process due to the coexisting endocervicitis. The backache is increased by standing and walking, and just before the menstrual epoch.

3. Changes in the character and type of the menstruation gradually develop. The intermenstrual interval may be shortened, the amount of the menstrual flow increased, and menstrual pain result from passive uterine congestion and hypertrophic changes in the endometrium. Dysmenorrhea of a congestive type is seldom absent.

4. Leucorrhea is almost invariably present. It is due to a hypersecretion of mucus which may be mixed with pus and microörganisms. The leucorrheal discharge is always increased just before and after the menstrual period.

5. Vesical irritability may cause the patient considerable annoyance in the extreme degree of retrodisplacement, from pressure of the cervix upon or dragging upon and distorting the vesical neck.

6. Dyschezia, or painful defecation, seldom becomes marked unless the backward deviation is complicated by prolapsed and adherent ovaries. The pressure of the fundus on the rectum, however, does give rise to constipation, hemorrhoids, and rectal tenesmus.

7. Sterility is not an uncommon result of retroversio-flexion, owing to the inaccessibility of the cervix to the spermatozoa. In adherent retroflexion or version abortion frequently occurs about the time that the uterus should rise out of the pelvis.

8. Digestive disturbances, such as a loss of appetite, gastric and intestinal indigestion, nausea and constipation may occur as indirect results of uterine malpositions, owing to the fact that the woman who is the subject of pelvic disease must lead a sedentary life and thus be denied the benefits of out-of-door exercise and sports. Like-

wise, such patients frequently complain of occipital or vertical headaches and various neuroses.

Diagnosis.—The diagnosis in retrodisplacements of the uterus is made on the following physical signs:

In retroversion the uterus is usually on a lower plane in the pelvis than normal.

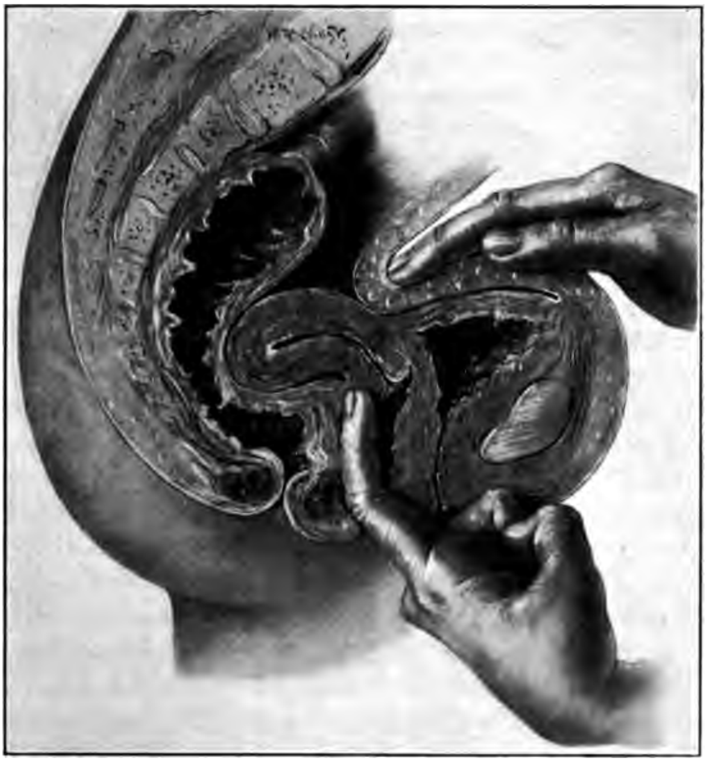


FIG. 48.—Diagnosis of retroflexion of the uterus. Body deep in the cul-de-sac.

The cervix is directed downward and forward, pointing in the axis of the vagina, or in third-degree retroversions, upward and forward, sometimes lying above the level of the symphysis. The fundus is not found behind the pubis. The uterine body is posterior. The sound will pass backward and demonstrates that the tumor mass found in Douglas' pouch is continuous with the cervix.

The sound, however, is seldom required for diagnosis. Movement of the cervix moves the mass in the *cul-de-sac.*

In retroflexion the cervix may be in normal position, directed downward and backward, or point in the axis of the vagina. The uterus is flexed on itself, making an acute angle between the cervix and body. The fundus is pressed between the uterosacral ligaments. The body may incline to either the left or right and the uterus as a whole is more or less prolapsed.

The shape and position of the body may be accurately mapped out by vaginoabdominal or rectoabdominal palpation. The cervix and body are generally enlarged. One or both ovaries are usually found in the cul-de-sac. The presence or absence of adhesions fixing the uterus is determined during bimanual examination in our efforts to replace it. Retroversio-flexion of the uterus may be simulated by a fibroid arising from the posterior uterine wall or a small ovarian cyst incarcerated in the pelvis. Bimanual examination under anesthesia will always make the diagnosis possible.

Pregnancy may coexist with retroversion or retroflexion.

Treatment.—Congenital retroversions, in virgins or in newly married women, producing no symptoms *need no local treatment;* special attention, however, should be given to the care of the rectum and pelvic colon, as fecal stasis is a common cause of pelvic complications.

The large majority of acquired retrodeviations occur during the puerperium, and should be recognized at that time, when *reposition and retention* by a pessary in the absence of tumors or inflammatory complications, is a comparatively easy matter. Reposition is favored by the patient assuming the knee-chest position several times a day or by having her walk on "all fours" night and morning (the monkey trot).

Tears of the perineum, pelvic floor, and cervix should be repaired, while cervical lesions and inflammatory conditions of the endometrium and parametrium should be treated by applications, douches, tampons, and posture before retention with a pessary is attempted.

Reposition of the uterus, without adhesions, in recent cases may be accomplished by bimanual manipulation, with the patient in the dorsal recumbent position, or reposited by instrumental manipulation of the cervix, with the woman in the knee-chest posture.

Methods.—1. With the patient in the dorsal recumbent position, the bladder and rectum being empty, and her corsets and clothing loosened, the cervix is drawn down with traction forceps and the fundus is pushed to the left and forward, while the cervix is swept to the right and backward with the fingers in the vagina, which also raises the uterus in the pelvis. Finally the fundus is caught and drawn forward by the fingers of the abdominal hand as the cervix is pushed into the hollow of the sacrum with the fingers of the other hand.

2. With the patient placed in the knee-chest position, the perineum is retracted with a Sims' speculum, which allows the air to enter the vagina, and balloon it. The cervix is caught with a traction forceps and dragged down in the axis of the vagina to free the fundus from the sacral promontory. The cervix is then pushed backward and to the right, while the fundus sweeps to the left of the promontory and forward. It may be necessary to displace the fundus forward with a finger in the rectum, as the cervix is drawn down in the axis of the vagina. Movable retrodisplacements are easily reposited by this method.

3. *Reposition by the use of the uterine sound or mechanical repositor is seldom permissible, as the danger from trauma and infection is considerable.*

When the uterus has been reposited, it must be retained in the corrected position. This may be done at first with the tampon, later with a pessary. The tampon should be of lamb's wool, saturated with boroglyceride, and should be placed with the patient in the knee-chest position below and in front of the cervix to hold it backward, *never behind it.* These tampons should be left in place for forty-eight hours and then removed while the woman is in the knee-breast posture. After the uterus has been reduced in size and all vaginal thickening and tenderness relieved by the intelligent use of astringent alkaline douches and boroglyceride tamponades, the permanent *retention of the uterus may be maintained by the pessary.*

Retention of the Pessary.—For successful retention by the pessary, *the reposition of the uterus must be complete.* The pessary must hold it in perfect anteversion, resting on the pubic shelf behind the pubis, and not project through the vulva or permit retroflexion over its posterior bar. The patient should be unconscious of its presence and should be instructed to remove it immediately if it causes pain. Too small a pessary will fail of its purpose. Too long or too wide a pessary will do harm by pressure on the vaginal walls. There should be sufficient room on every side of the pessary to admit the finger. Too sharp a posterior curve may permit retroflexion of the fundus over the posterior bar, while a too little downward anterior curve may irritate the urethra and vesical neck. In much relaxation of the pelvic floor the pessary fails, because it is frequently not well retained.

Function of the Pessary.—The function of the pessary is to antevert and raise the uterus in the pelvis by raising the upper part of the posterior vaginal wall. *The posterior vaginal wall runs around the posterior or upper bar as a pulley and draws the cervix upward and backward.* The anterior bar takes its purchase behind the pubis, and is retained in this position by the pelvic floor. It thus supports the anterior vaginal wall.

For general use in retaining in anteversion the reposited retroverted uterus, the Smith-Hodge or Thomas polished hard-rubber pessary are most serviceable. Soft-rubber rings are rarely advisable, as they become foul and provoke vaginitis by irritating the vaginal mucosa. Hard-rubber pessaries can be sterilized by immersion in a 1 to 500 solution of mercuric bichloride. Boiling destroys their shape. *In adjusting a pessary it may be necessary to change the shape and curve to fit the individual vagina.*

Hard-rubber pessaries may be bent as required after softening by heating, when well oiled, over a spirit lamp or Bunsen flame.

Having determined the length and width of the pessary required, by measuring the distance from the posterior fornix to just behind the pubis, and the width of the vagina at a point about an inch below the cervix, a pessary surgically clean and well lubricated, of proper dimensions, is selected *and introduced* in the following manner: The patient is in the dorsal recumbent position, and the labia separated with the thumb and index finger of the left hand, while the pessary is held by its anterior bar, with the posterior bar obliquely against the vulvar fissure, and is inserted into the anterior-posterior diameter of the vagina. It is then rotated and pushed downward and backward in the vagina along the curve of the pelvis until the posterior

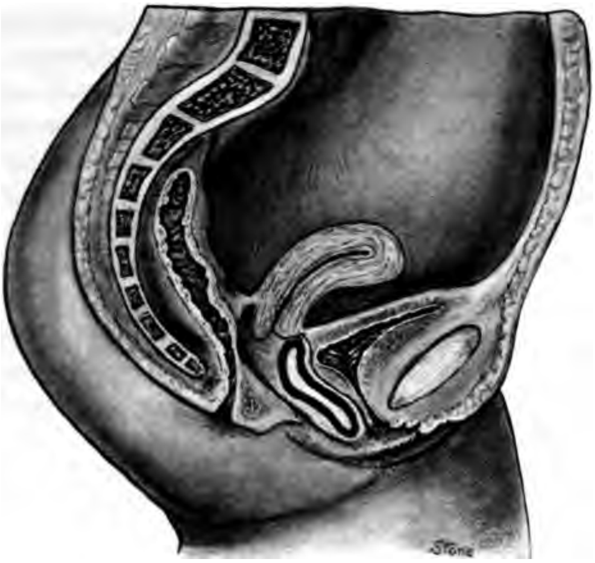


Fig. 49.—Posterior bar of pessary in front of the cervix.

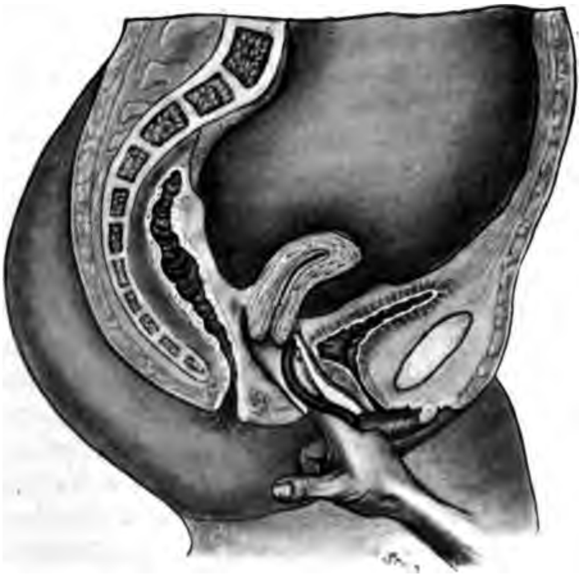


Fig. 50.—The index finger depresses the posterior bar.

bar lies transversely in the vagina just in front of the anterior lip of the cervix (Fig. 49). When the index finger is introduced into the vagina and depresses the posterior bar until it slips under and back of the cervix (Fig. 50) to make traction on the posterior vaginal wall.

Occasionally advantage may be gained by introducing the pessary with the patient in the knee-chest position. If the pessary fits properly the patient should be unconscious of its presence.

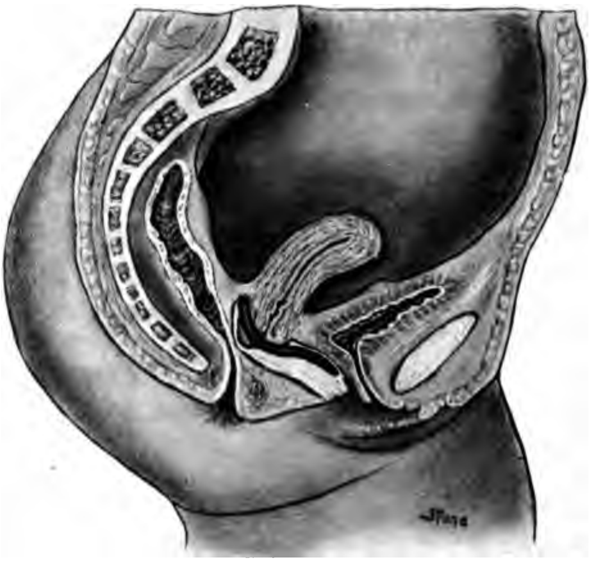


FIG. 51.—Pessary in place.

Examinations at intervals of a few days or a week are advisable for two or three weeks, to make sure that the uterus is maintained in the normal position.

Care of the Pessary.—A pessary is a foreign body and always causes some vaginal irritation, hence it is necessary to teach each patient how to keep the vagina clean and free from irritation. An alkaline vaginal douche of borax and bicarbonate of soda, one tablespoonful of each to the quart of water, should be given once daily. She should report for examination every six weeks, in order that the pessary may be removed and repolished, or a new instrument should be introduced every three or four months. A *pessary* *which causes pain should be promptly removed.* Excoriated areas in the vagina may be treated with silver nitrate solution, 10 grains to the ounce.

When pregnancy occurs in a uterus which is maintained in its position by a pessary, the instrument should be worn until the beginning of the fourth month, when the uterus will be large enough to rise out of the pelvis and needs no further support until after labor has occurred, when with proper care during the puerperium a cure may be expected.

Puerperal Cases.—In retrodisplacement of the uterus after labor, reposition and retention of the uterus by the use of a properly filling pessary from the third or fourth week postpartum usually results in a permanent cure. The instrument may be removed in about three months, or when involution is complete.

Contraindications to the Use of a Pessary.—A pessary is contraindicated when any of the following conditions are present:

1. *A large, lax introitus without sufficient muscular structure in the pelvic floor to hold a pessary in place.*
2. *In lacerations of the cervix with hyperplastic change and parametric inflammation in the base of the broad ligaments or in the uterosacral ligaments.*
3. *In inflammation of the pelvic peritoneum.*
4. *In the presence of prolapsed tender ovaries.*
5. *In the presence of posterior uterine adhesions limiting the mobility of the uterus.*

The ideal case for a pessary is where the uterus is small or of moderate size, freely movable, easily reposited into anteversion, without parametric, peritoneal or ovarian complications, and with a pelvic floor of sufficient tone to hold the pessary in place.

Parametric, peritoneal and tubovarian inflammations must be quiescent and all *exudative processes completely* absorbed before a *pessary can be employed,* even though it is possible to reposit the uterus and correct its malposition.

Parametrial and peritoneal exudates *may resolve in time* (1) by improvement of the general health with food, tonics, fresh air, rest, regulation of the bowels, and sitz baths, and (2) by local treatment. The absorption of exudates may be hastened by the use of the electric light bath or thermo-light (dry heat) over the abdomen, in seances of thirty minutes twice daily, exposing the indurated area to a temperature of 150° to 200° F.; this produces a local hyperemia.

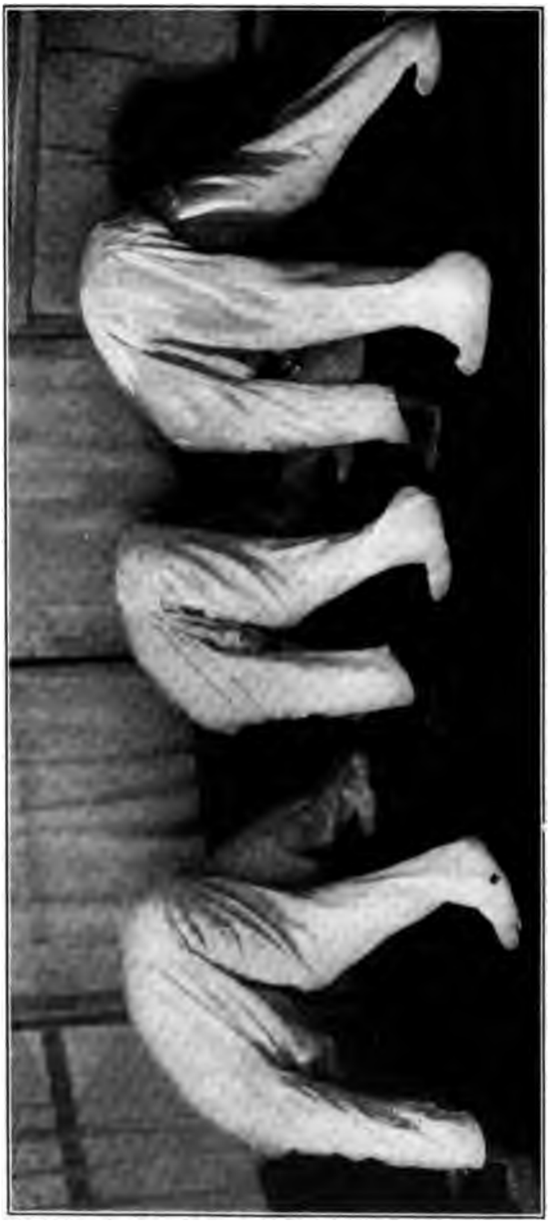


FIG. 52.—Beck's "monkey walk" to prevent puerperal retroversion as employed in the author's Clinic, Long Island College Hospital.

Other therapeutic agents which may contribute to the rapid solution of chronic pelvic inflammations are vaginal douches of hot water of 115° to 120° F.; one or two gallons given slowly, and used twice daily. The douch may be followed by vaginal tamponades of lambs' wool saturated with boroglyceride and glycerin, 1 to 4, or ichthyol and glycerin, 1 to 10, which are renewed every two days; or pressure may be applied to the vault of the vagina by filling the vagina with mercury, small shot, or hot sand, used with the patient in a high Trendelenburg position. The vaginal wall is protected by a large condom which after it is carried well up to the vault is filled with heated mercury or sand. The resulting adhesions may be lengthened and the mobility of the uterus materially improved by deep pelvic massage this procedure however is not free from the danger of causing an exacerbation of the inflammation. Galvanism also has a great absorbent power on pelvic adhesions. For details as to its use the reader is referred to the works on electrotherapeutics.

Operative treatment of retrodeviations include (1) reducing the weight and diminishing the size of the uterus by curettement, cervical repair or cervical amputation; (2) restoring its support by reconstruction of the damaged pelvic floor and anterior fascial sheaths; (3) maintaining the uterus in normal anteversion by employing one of the several methods of shortening the round ligaments; and finally if the uterosacral ligaments have been elongated as is the case in descensus the cervix may slide forward and the retrodisplacement will recur, this can be prevented by plication of the uterosacrals to such a degree that the cervix will point backward toward the sacrum.

Shortening of the Round Ligaments.—(Extraperitoneal Methods.)—The modified Alexander operation is indicated only when the uterus is small and movable, and the malposition is uncomplicated by tumors, extensive disease of the adnexa, parametritis, or chronic peritoneal inflammation. Unfortunately this procedure has but a limited field for most cases of retrodeviation of long standing have produced some periuterine pathology which requires celiotomy for its correction.

Technic.—An incision is made through skin and superficial fascia from the spine of the pubis, parallel to Poupart's ligament and one-half an inch above it, from the external to the internal ring, exposing the superficial fascia, which is divided and the aponeurosis of the external oblique exposed. Care is taken to locate and avoid injuring the superficial epigastric and superficial iliac vessels. The external ring is now located with the finger, and its upper and lower margins pulled up with narrow retractors; the loose fat bulges out. The roof of the canal is divided throughout its entire length, avoiding the veins and loose tissue just beneath the roof. Retractors expose the canal and permit the operator to isolate the round ligament lying in it. Special care should be taken to avoid injury of the ilioinguinal nerve while isolating the ligament. For injury to this nerve is the cause of hernia in the operation wound.

When the ligament is identified and isolated, it is drawn out for four or five inches, stripping back the infundibular process. Muscle bands going to the ligament may need to be snipped with the Mayo scissors to make it run free. Adhesions holding the fundus and minor lesions of the adnexa may be dealt with, if necessary, through the open internal ring. The ligament is clamped and the wound covered with a sterile, moist "lap sponge," while the ligament on the opposite side is isolated and drawn out in a similar manner. Having drawn out sufficient ligament on both sides to bring the fundus well up in anteversion to a point just behind the pubis, we may proceed to suture the internal oblique muscle to the inner face of Poupart's ligament, one-fourth of an inch from its edge, using about four sutures of No. 1 chromated catgut, each suture transfixing the round ligament. Then the aponeurosis of the external oblique is sutured to the inner edge of Poupart's ligament to restore the anatomy of the canal and the skin edges are brought together with clips or a running suture of fine silk. The wound is dried and a gauze dressing applied and held in place with a double spica bandage. The after-treatment is simple. The skin sutures are removed in ten days; the patient remaining in bed for two weeks and is then allowed the freedom of the room. Hernia seldom occurs when primary union has taken place unless the ilioinguinal nerve has been injured in the course of operation.

Intra-abdominal Operations for Shortening the Round Ligaments.—Three methods deserve a detailed description, *i. e.*, the technic of (1) Webster and Baldy, (2) of Coffey, (3) of Gilliam, Simpson and Montgomery.

Webster-Baldy Operation.—The perfect correction of a retrodeviation of the uterus by this operation must depend on the following conditions:

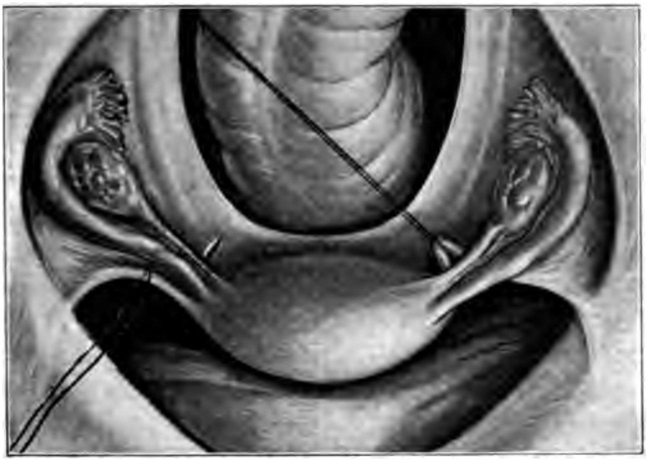


Fig. 53.—Webster-Baldy operation. A "guy" rope is passed around each round ligament and the loop of ligament is drawn back through the opening in the broad ligament.

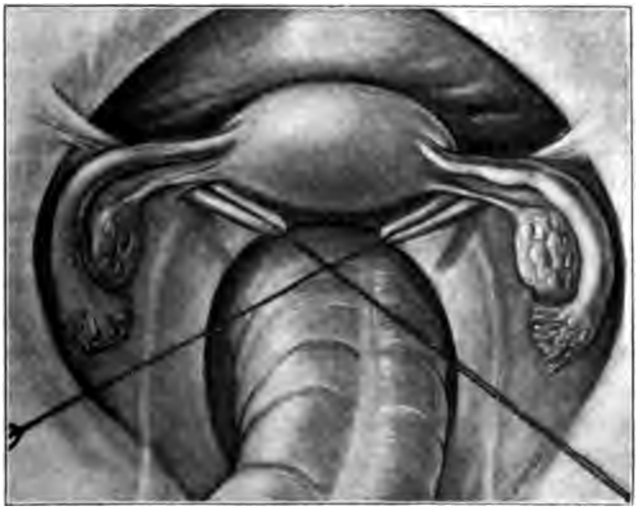


Fig. 54.—Webster-Baldy operation. The ligaments are brought back of the uterus.

1. A cervix held backward and upward by well-developed uterosacral ligaments.
2. A good pelvic floor to preserve the position and integrity of all of the pelvic organs.

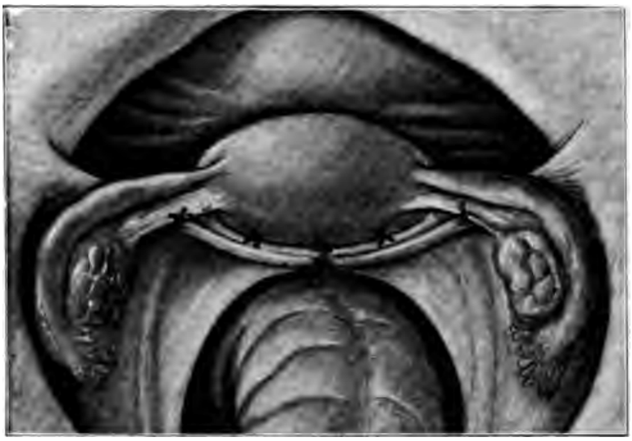


FIG. 55.—Webster-Baldy operation. The encircling loops are sutured to the posterior wall of the uterus, below the level of the uteroövarian ligament.

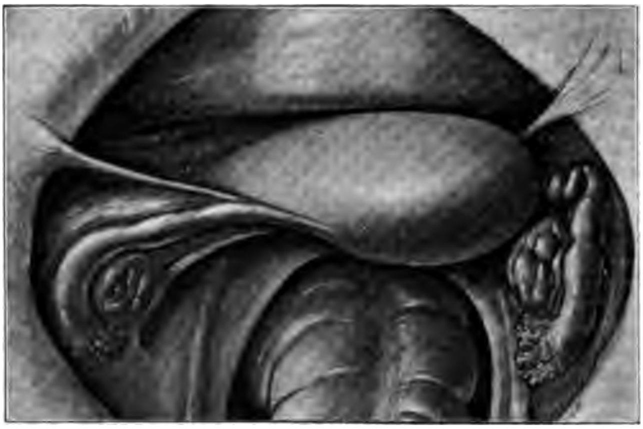


FIG. 56.—Some complications due to errors in technic and selection of cases. Marked lateroversion of uterus, following the Webster-Baldy procedure.

3. A uterus of moderate size and weight, and round ligaments of equal length and thickness, which can be made to encircle the uterus.

Technic.—With the patient in the Trendelenburg position, the abdomen is opened by a short longitudinal or transverse incision, just above the pubis, and a provisional silk ligature (to act as a "guy rope") is passed around each round ligament at the junction of the inner and middle third or at such a point that treaction on the ligament does not angulate the tube. A taper-pointed hemostatic forceps, or preferably, a Cleveland ligature carrier is pushed

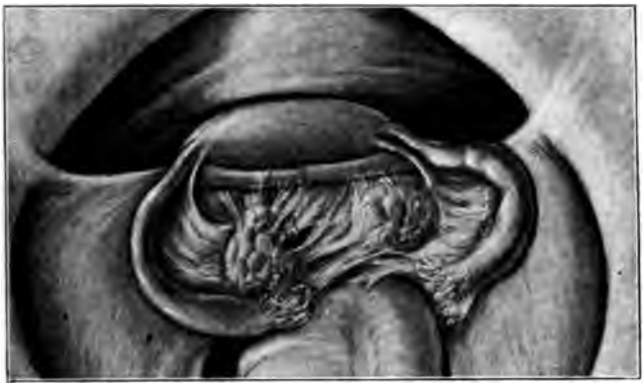


FIG. 57.—Ovaries adherent to each other, following the Webster-Baldy procedure.

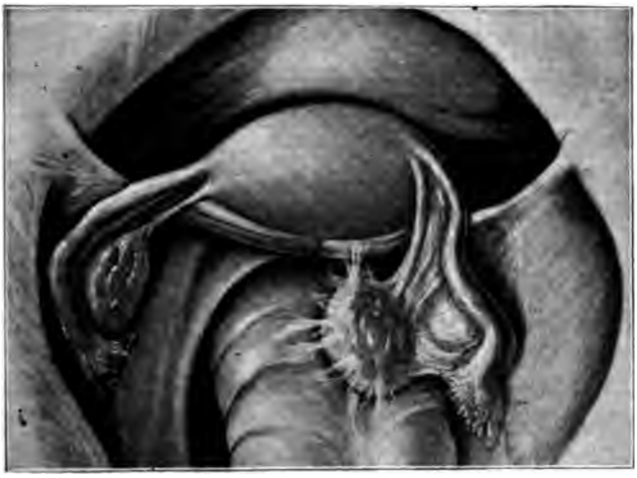


FIG. 58.—Prolapsed cystic and adherent ovary with long ovarian ligament, following the Webster-Baldy procedure.

from behind forward through the broad ligament in the free space close to the uterus under the tube and round ligament and *just below the ovarian ligament*, and catching the provisional ligature, the loop of ligament is then drawn back through the opening made in the broad ligament (Fig. 53). The other round ligament is brought back of the uterus in a similar manner (Fig. 54), and both loops are stitched securely to the posterior surface of the uterus just below the level of attachment of the ovarian ligaments (Fig. 55) to form a sling or encircling band about the posterior face of the uterus, carrying the fundus forward and elevating the ovaries. The opening in the broad ligaments is sutured to the distal end of the loop of round ligament to prevent hernia, and to cover in any raw surface. This also tends to pull the ovaries outward.

When properly done in selected cases, the intra-abdominal pressure will be directed upon the posterior fundal wall, and the uterus is held forward by the encircling band formed by the round ligaments, and the downward pull of the round ligaments on the uterine cornua.

The Coffey Operation.—The Coffey operation or plication of the round and anterior layer of the broad ligaments, should be limited to those retroflexions and retroversions in which the cervix is held well back toward the sacrum by well-developed or tense uterosacral ligaments, as the final results are unsatisfactory in those cases in which the cervix lies in the axis of the vagina, unless the operation is supplemented with one of the methods used for shortening the uterosacral ligaments. Unless these indications are carefully observed the uterus as a whole is anteposited and sooner or later falls into retroversion.

Technic.—The abdomen is opened and after freeing adhesions and giving proper attention to the condition of the ovaries and tubes, a smooth pointed, full-curved needle, armed with No. 1 chromated gut is passed through the top of the round ligament at a point about one and one-half inches from the uterine cornu, and then carried down to and through the front of the uterus in the median line, just above the internal os. The opposite ligament is treated in a similar manner. Fastening the two ligaments at this point draws the lower segment of the uterus upward and forward. A second suture grasps the ligament at the junction of the middle and outer thirds, and fastens it to the anterior lateral corner of the fundus, just in front of the tubal origin. A similar procedure on the opposite side carries the fundus forward. The middle third of the ligament now runs up the anterior face of the uterus on either side, between the two fixed points, *i. e.*, the internal os and the uterine cornu. This portion of the ligament is tacked to the front of the uterus with several interrupted sutures. The anterior peritoneal layer of each broad ligament is then brought over the anterior face of the uterus and sewn to it in the median line, plicating the ligament and carrying the fundus farther forward until the uterus is actually suspended by the parietal peritoneum of the pelvic end of the broad ligaments.

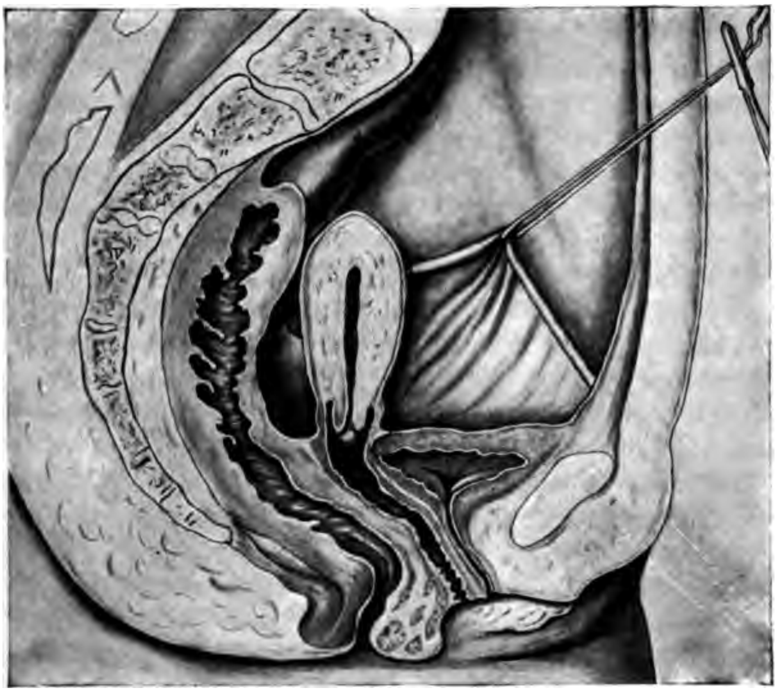


Fig. 59.—Gilliam-Montgomery operation. First step. A "guy" suture is passed beneath each round ligament one and one-half inches external to the uterus.

Unless this operation is supplemented by shortening of uterosacral ligaments, the uterus is anteposited, not anteverted.

Gilliam-Montgomery Operation.—"A curved transverse incision, is made when possible, within the pubic hair line, through the skin, fat, superficial fascia, and aponeurosis.

"The aponeurosis is loosened from the pyramidalis and recti muscles and drawn upward, the recti muscles separated, and the peritoneum divided in the vertical line, thus exposing the pelvis. After giving attention to the condition of the ovaries and tubes, a silk "guy" suture is passed beneath each round ligament one and a half inches external to the uterus. The ends of the suture upon one side are threaded into the eye of a special Deschamps needle having a rather long arm. The round ligament external to the suture is seized with a hemostat and given to an assistant with the direction to keep it taut. An opening is then made in the anterior layer of the broad ligament, just below the insertion of the suture,

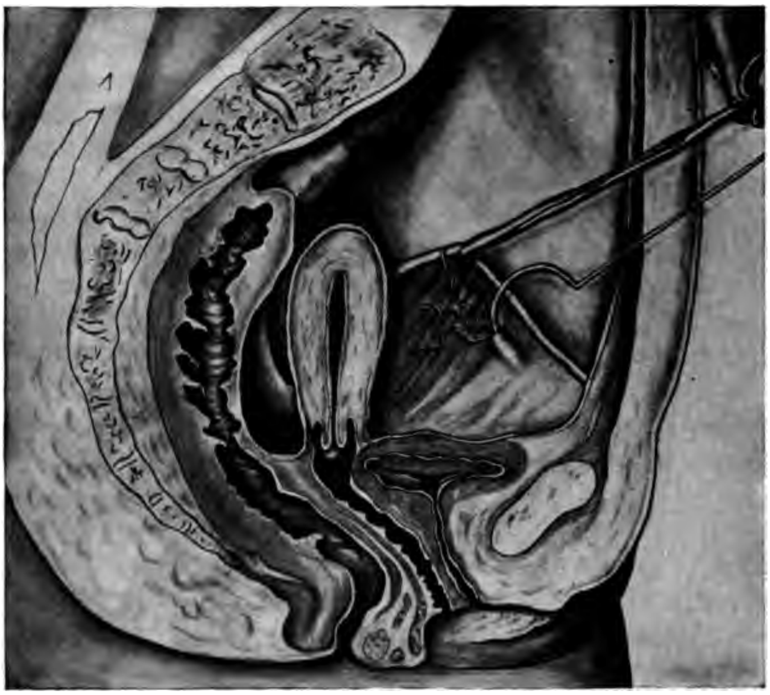


FIG. 60.—Gilliam-Montgomery operation. Second step. Silk "guy" passed around the round ligament and threaded in a Deschamps needle, which is being carried through the anterior layer of the broad ligament.

and through this opening the needle carrying the ends of the suture is introduced and carried outward between the layers of the broad ligament until the parietal peritoneum is reached, when the latter is drawn inward and the point of the instrument plunged through the abdominal parietes, emerging on the aponeurosis. The suture ends upon each side are withdrawn from the Deschamps needle and secured by a hemostat. Seizing the suture upon one side and drawing upon it to make it tense, a pair of pointed scissors, closed, is thrust alongside the ligature, and the blades separated, enlarging the opening in the aponeurosis and muscle, when in the majority of cases, the traction causes a loop of the ligament to follow the withdrawal of the scissors. Where it does not follow, it can be teased through by pressing back the tissues as traction is being made on the loop. Having thus brought a loop of each ligament through

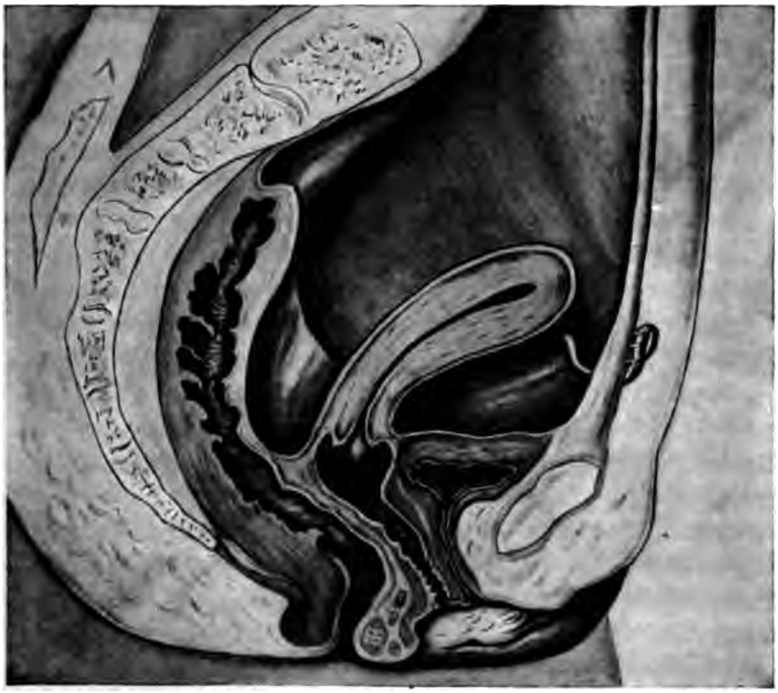


FIG. 61.—Gilliam-Montgomery operation. Third step. Loop of ligament is carried beneath the peritoneum and through the aponeurosis just above the pubis and sutured to it.

the wall, the loop is secured to the aponeurosis by catgut sutures and the abdominal wall is closed in layers."

The modification of this operation made by Simpson consists of passing a pair of specially devised curved forceps through the internal ring, along the inguinal canal and drawing the loop of ligament out through this passage instead of carrying it between the folds of peritoneum.

In those patients where traction on the round ligaments owing to their close fusion with the tubes, cause "kinking" of the tube—the round ligaments beginning at each cornu may be sutured to the anterior parietal peritoneum—making an anterior suspension which does not interfere with labor. Figs. 64 and 65.

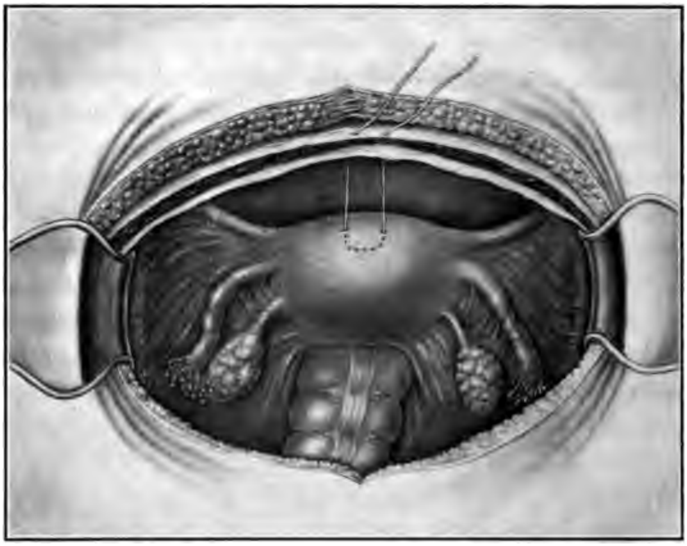


FIG. 62.—Ventrosuspension. Suture passed through the peritoneum and transversalis and through the uterus just posterior to the fundus.

Hysteropexy or Ventrosuspension of the Uterus.—This is an operation which is seldom advisable in women likely to become pregnant, since ventrofixation may result and cause serious dystocia during labor.

Technic.—With the patient in a moderate Trendelenburg posture, and the bladder empty, an abdominal incision two or three inches long is made in the median line three-fourths of an inch above the symphysis.

The edges of the cut peritoneum are drawn out, pelvic adhesions freed, and the ovaries and tubes examined. The uterine fundus is then brought up and held with the fingers or with a special instru-

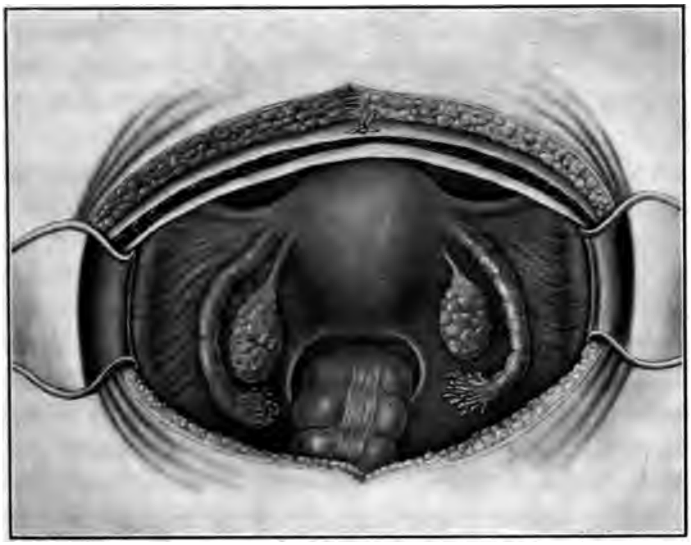


FIG. 63.—Uterosuspension. Suture tied, anteverting the uterus.

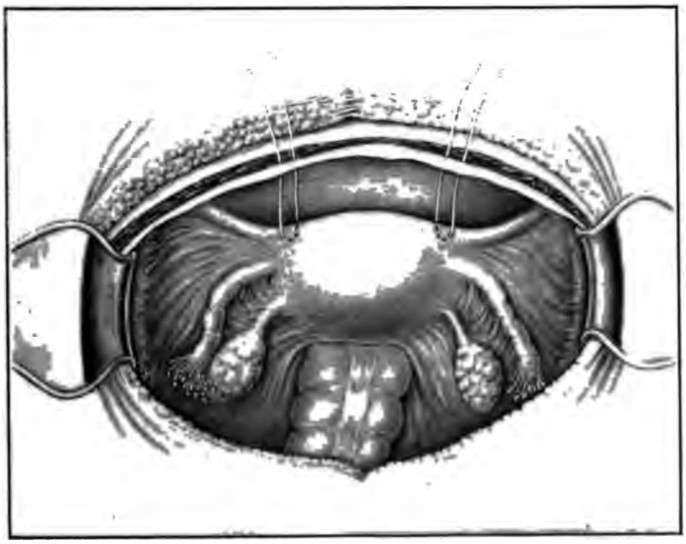


FIG. 64.—Suspension of the uterus by the round ligaments at their uterine insertion.

ment grasping the body, and the suspension sutures of No. 2 chromated catgut or fine silk are passed parallel with the abdominal incision.

The first suture catches the posterior uterine wall one-half an inch below the level of the tubes and one-fourth of an inch external to the median line, and is then passed through a fold of parietal peritoneum and the overlying transversalis fascia, one-fourth of an inch from the peritoneal edge, and tied.

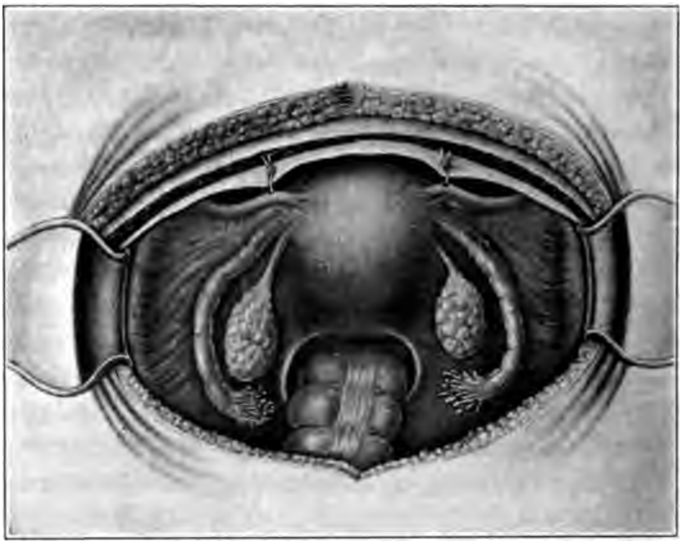


FIG. 65.—Sutures tied, making a two-point anterior suspension, which does not interfere with subsequent pregnancy.

The second suture is passed in like manner on the opposite side of the abdominal incision.

The sutures should be placed one and one-half inches above the symphysis, and each should include about one-half inch of parietal peritoneum and transversalis fascia, and the same width and half as much depth of uterine tissue. The abdominal wound is then closed in layers.

Most operators pass the sutures transversely, each suture grasping a fold of peritoneum and subperitoneal tissue on one side, then the uterus just posterior to the fundus and a fold of peritoneum and subperitoneal tissue on the opposite side.

Ventrofixation.—Ventrofixation of the uterus should be employed only in women past the menopause, or in those in whom *both tubes* have been removed.

Technic.—The procedure differs little from that of suspension, except that the posterior surface of the fundus is scarified or denuded of its peritoneum over an area of one square inch, and sutured to the muscles of the abdominal wall with two or three silkworm-gut sutures passing through the skin, aponeurosis, muscle, and uterus. These stitches are usually left in place for several weeks. The remaining portion of the abdominal incision may be closed in layers.

Should the vaginal orifice be relaxed, suspension or fixation should always be supplemented with a colpoperineorrhaphy.

Shortening the Round Ligaments by the Vaginal Route.—Shortening the round ligaments by the vaginal route has many advocates, but the method should be limited to those retrodeviations which are uncomplicated by adhesion and adnexal inflammation with roomy vaginæ and a large pelvic outlet.

Technic after Repair or Amputation of the Cervix—The cervix or cervical stump is grasped with a volsellum and drawn downward and backward. An incision is made across the anterior lip of the cervix, through the vaginal wall, just below the junction with the bladder, connecting with a longitudinal incision extending down the anterior vaginal wall from the middle of the transverse incision to within one inch of the meatus.

The vaginal flaps are dissected back and the bladder separated from the front of the uterus until the uterovesical pouch is exposed.

The bladder is then retracted with a suitable retractor and the peritoneum opened.

The lower third of each round ligament is drawn taut and stitched to the horn of the uterus with interrupted catgut sutures. The loop of ligament thus formed is stitched to the front of the uterus becoming adherent to the uterus and the bladder.

The peritoneal and vaginal wounds are closed and the operation supplemented by the restoration of the pelvic floor and vaginal outlet.

After-treatment—The bladder should be emptied every four or six hours for the first three or four days, or until the patient is able to void voluntarily. The patient may sit up in a week and be out of bed in ten days. A pessary should be worn for three months after the operation in order that the suspensory ligaments may not be over-stretched by the drag of a heavy uterus.

The author has found that the success or failure of any of the round-ligament operations depends largely on the after-care of the individual patient, for the months immediately following the procedure. Wearing a suitable pessary until the pelvic structures have been reduced in size and have regained their tone contributes largely to successful end-results. There is no time at which douches, posture, and pelvic depletives do so much as in the three months following an operation for retrodeviation.

PROLAPSE OF THE UTERUS.

In prolapse, the uterus always sinks decidedly below its normal level in the pelvis. *Prolapsus uteri is a downward displacement of the uterus* and should be regarded as a hernia of the uterus, adnexa, bladder, rectum, and vagina, resulting from injury to the fascial supports and an increase in the intra-abdominal pressure.

The principal uterine supports are the uterosacral ligaments and the uteropelvic ligaments in the base of the broad ligaments. It is, however, the fascial sheaths which maintain the pelvic viscera in their normal relation to one another, *i. e.*, those fascial plates making up the anterior and posterior triangular ligaments, the visceral layer of the rectovaginal fascia, and the levatores ani muscles. If, therefore, these pelvic supports are weakened by injury or overstretching, or the intra-abdominal pressure changed by incompetence of the abdominal wall and the weight of the uterus is increased, prolapse of the pelvic structures will take place at one or more of the four cleavage planes (Fig. 66), *i. e.:*

1. In the postpubic attachment close to the bone, which allows the descent of the urethral segment, or

2. In the urethrovaginal septum, close behind the urethra, injury at this point permits the descent of the bladder base, the cervix, and the anterior vaginal walls, or

3. In the rectovaginal septum in the structures just behind the vagina by division of the attachments of the levatores ani in which

case the rectum will slide down and protrude through the posterior vaginal wall, or

4. Along the anorectal canal which allows the rectal mucous membrane to invert through the anus.

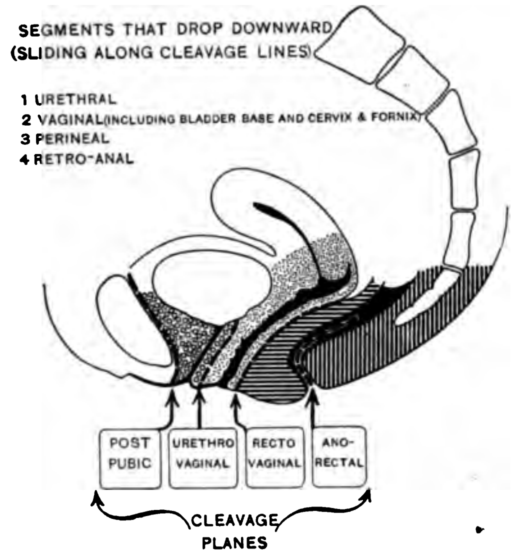

SEGMENTS THAT DROP DOWNWARD
(SLIDING ALONG CLEAVAGE LINES)
1 URETHRAL
2 VAGINAL (INCLUDING BLADDER BASE AND CERVIX & FORNIX)
3 PERINEAL
4 RETRO-ANAL
POST PUBIC
URETHRO VAGINAL
RECTO VAGINAL
ANO-RECTAL
CLEAVAGE PLANES

FIG. 66.—(From Dickinson.)

The Degree of Uterine Prolapse.—*Descensus uteri, or incomplete prolapse,* is where the prolapsed uterus and vaginal walls do not descend beyond the vulvovaginal orifice. Retroversio-flexion of the uterus is a common complication of descensus.

Complete prolapse, or procidentia, is where the uterus is nearly or completely without the vagina; in the latter there is a hernia of the pelvic viscera.

There is always some degree of inversion of the vaginal walls accompanying *descent* of the uterus; whether the anterior or posterior wall descends first depends upon the point of injury, whether it is postpubic or in the vesicovaginal or rectovaginal fascial plate.

When the vaginal inversion does not protrude from the vulva outlet it is described as *descensus vaginæ;* when the vaginal walls protrude beyond the introitus it is *prolapsus vaginæ.*

The *bladder always accompanies descent of the anterior vaginal* *wall;* the urethra is also frequently carried downward, so that the neck of the bladder is on a lower level than the meatus, this allows the accumulation of residual urine in the bladder and accounts for many of the vesical symptoms, likewise the *rectum follows the prolapse of the posterior vaginal wall.*

Causes.—*The predisposing causes* are found in the impairment of the supports of the pelvic viscera, resulting from the injuries of childbirth, *i. e.*, injury to the muscles of the uterogenital trigone and detachment of the anterior vaginal wall from its subjacent attachments or lacerations of the rectovaginal or anal fascia and levatores ani muscle; or senile atrophy; or an abnormally roomy pelvis; or congenital malformation of the body, which changes the inclination of the pelvic brim, as is found in the ptotic type of women. Prolapse of the structures in the posterior segment is commonly noted in the woman with a funnel pelvis with an ample posterior sagittal diameter, while descensus with inversion of the vaginal walls is usual in women with a wide outlet.

The exciting causes are: Excessive intra-abdominal pressure or extreme relaxation of the abdominal walls. This may be occasioned by the presence of tumors, fecal impaction, ascites, tight clothing producing *abdominal constriction, straining* and *lifting,* as practised by the working classes or the relaxation following prolonged labor—twins or hydramnios or *habitual overdistention of the bladder,* causing elongation of the round ligaments, thus allowing the intra-abdominal pressure to be applied against the anterior fundal face of the uterus, driving it downward or *increased weight of the uterus as in subinvolution* following abortion and labor. Improper management of the puerperium, *by keeping the patient on her back too long after labor;* the use of a tight abdominal binder when the involuting uterus is in the true pelvis; etc., or an incorrect posture in standing, sitting and walking.

Congenital prolapse in the nulliparous woman occurs due to congenital deficiencies in the pelvic and uterine supporting structures—these are usually found in the hypothyroid type with deep posterior invaginations of the cervix—or in the ptotic type with the long conical cervix. Prolapse in the nulliparous is extremely rare.

Complications.—As the uterus descends in the pelvis, there is always more or less inversion and prolapse of the vaginal walls, with accompanying cystocele and rectocele. This leads to constipation, varicosities of the hemorrhoidal veins, with chronic proctitis and vesical irritability. Owing to the fact that the vesical neck and trigone are on a lower level than the meatus, the bladder is never completely emptied, and the residual urine becomes the habitat of bacteria; hence cystitis results; or the vesical irritation may be produced from traction on the neck of the bladder by the dragging of the uterus or cystocele when the woman is on her feet.

Extensive prolapse may be complicated with ureteral obstruction, producing hydroureter, hydronephrosis and pyelonephrosis.

In the uterus itself, during the period of menstrual activity, a passive congestion obtains, due to an obstruction in the efferent circulation and varicosities in the pelvic veins; this leads to a small, round, tissue-cell proliferation and consequent hypertrophy of the endometrium, with enlargement of the entire organ, or hyperplastic changes may take place only in the supra- or infravaginal portions of the cervix. The uterus is often excessively elongated, the cavity measuring from six to eight inches. Frequently the cervix is torn and its lips everted, and enormously hypertrophied. A pelvic peritonitis may be present. Strangulation and gangrene of the prolapsed uterus with acute peritonitis may occur and has resulted fatally. The change in the intra-abdominal pressure by relaxation and descent of the pelvic viscera favors enteroptosis. In procidentia, the prolapsed portion of the uterus and vaginal walls become dry, edematous, and eroded.

Symptoms.—Rarely the patient complains of no discomfort or symptoms referable to the pelvis, even in extensive prolapse; commonly, however, she suffers from lumbosacral backache from traction on the uterosacral ligaments, pain in the lower lateral quadrants from traction on the broad ligaments; and pelvic tenesmus, which is increased by standing or walking and relieved by lying down, as is the history of visceroptoses; irritability of the bladder or incontinence of urine on laughing or coughing, dysuria, or dyschezia. The menstrual function is frequently disturbed, being prolonged or excessive. Metrorrhagia may occur, though menorrhagia is the rule.

The venous engorgement and consequent endometrial hypertrophy produces a leucorrhea. The parts protrude and interfere with locomotion. Sterility is common in procidentia; though pregnancy may occur in a uterus wholly outside of the vulva.

The degree of physical disturbance varies usually with the degree of the prolapse.

Diagnosis.—The diagnosis is made by inspection and palpation.

Inspection.—In *descensus*, or incomplete prolapse, the introitus is relaxed and there is more or less protrusion of the vaginal walls. The cervix is low in the pelvis and in the axis of the vagina, and may be made to show at the vulva by having the patient cough or strain.

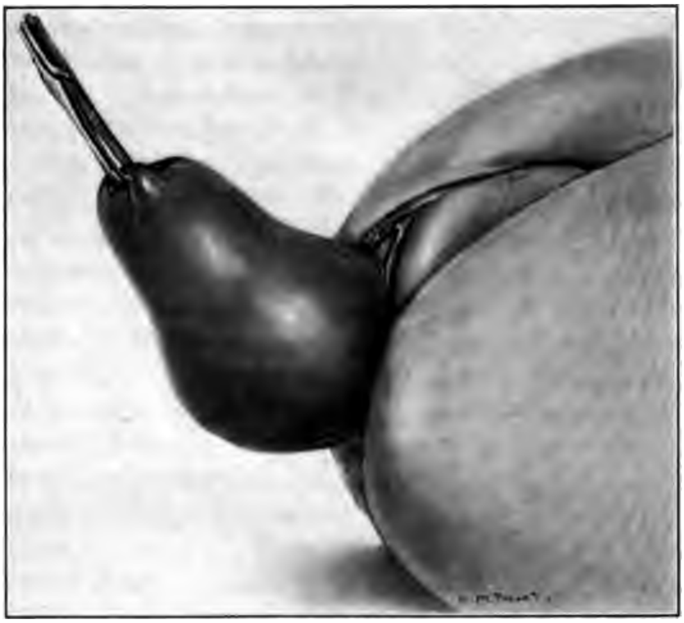


FIG. 67.—Complete procidentia with inversion of the vagina.

In *procidentia* the cervix, or the entire uterus protrudes from the vulvar orifice, together with a more or less complete inversion of the vaginal walls and bladder. The erect posture exaggerates the amount of the protrusion, which may be as large as a fetal head. From friction the vaginal walls become thick, dry and tense, resembling ordinary epidermis.

The amount of rectocele may be determined by passing the gloved finger into the rectum and following the line of the rectocele as it protrudes from the vulva. The amount of bladder displacement may be shown by passing a sound into the bladder to outline its lower limits.

The size and shape of the uterus can usually be made out by drawing it down with a tenaculum until it can be palpated by recto-abdominal or rectovaginal touch in its entirety.

The depth of the cavity of the uterus should be measured. It is well to determine whether the elongation is due to hypertrophy of the infravaginal cervix. Finally all cases of prolapse should be examined in the standing posture in order that a full appreciation of the amount of descent may be had.

Treatment.—Treatment may be considered under two headings: (1) prophylactic; (2) remedial.

1. The *prophylactic* treatment includes the proper care of the interpartal and puerperal woman, by the avoidance of cervical and pelvic-floor injuries during labor, and the repair of such injuries should they occur, followed by rest in bed after labor, for two weeks or more, or until involution is well advanced, maintaining the mobility of the uterus and the tone of the abdominal muscles, by frequent change of posture and both active and passive exercises. *Too much stress cannot be put upon the importance of postural treatment during the puerperal period,* for the maintenance of a *persistent dorsal posture* or the use of a tight obstetric binder after the fundus reaches the brim favors prolapse.

The employment of a properly fitting pessary for *two or three months after labor, when there is a tendency for the subinvoluted uterus to become retrodisplaced or prolapsed, is of the greatest prophylactic value.*

2. The *remedial treatment* is divided into the (1) *preparatory,* (2) *permanent retention.* The preparatory measure consists in the replacement and retention of the uterus in its proper pelvic relations. *Replacing the uterus* tends to establish an equalized pelvic circulation, and thus reduce the size of the uterus, the thickness and hardness of the vaginal walls, by diminishing the edematous swelling. Erosions and ulcerations of the cervix should be treated with the tincture of iodine or an argentic nitrate solution of 10 grains to ℥j, while the patient's general health should receive careful attention. Local changes in the pelvic tissues may be improved by having the

patient assume the *knee-chest position* or by walking on all fours (the monkey trot) three times a day, which favors reposition; or by local blood-letting, by scarification of the cervix; or by the *boroglyceride tamponades,* which, because of their hydroscopic action, diminish the uterine bulk; or by the *hot douche,* given with a Davidson syringe, which improves the tone of the supporting structures, the ligaments and the vaginal walls.

Before any attempt at permanent retention is made the patient should be placed *in bed in the Trendelenburg posture,* this favors depletion of the overloaded pelvic veins; while *pelvic massage* relieves the engorgement of the bloodvessels; and *the judicious use of tonic laxatives and enemata* greatly improve the patient's general health.

Straining, lifting, or any increase in the intra-abdominal pressure by the use of tight or heavy clothing must be avoided. While replacement is desirable in order to establish a circulatory equilibrium within the uterus, forcible *replacement is contraindicated in the presence of acute or subacute pelvic inflammation.*

Permanent retention of the uterus may be obtained:

1. By artificial supports (mechanical measures) as tamponades or pessaries.
2. By operative measures.

Artificial Supports (Mechanical Measures).—Pessaries, such as the Menge hard-rubber ring, the Gerhung U-shaped supporter, or the hard-rubber or glass ball are useful to retain the uterus when operative measures cannot be employed, and there is sufficient pelvic fascia left intact to keep the supporters within the vulvovaginal orifice. Braun's colpeurynter or similar air-inflated rubber bags have a field in some inoperable cases.

Operative Measures.—In order that the uterus, bladder, and rectum may be retained within the pelvis by operative measures, it is necessary that the operator appreciate by what line or lines of cleavage the prolapse has originally occurred.

In moderate prolapse, in childbearing women, without complicating retrodeviation, a cure may usually be effected by repair or amputation of the cervix, to diminish the weight of the uterus, together with an anterior colporrhaphy and restoration of the pelvic floor. Special care should be given to reëstablish the normal axial relation between the uterus and the vagina; the cervix must point toward the sacrum to be retained by the anal fascia, while the body must be well anteverted to rest on the pubic shelf.

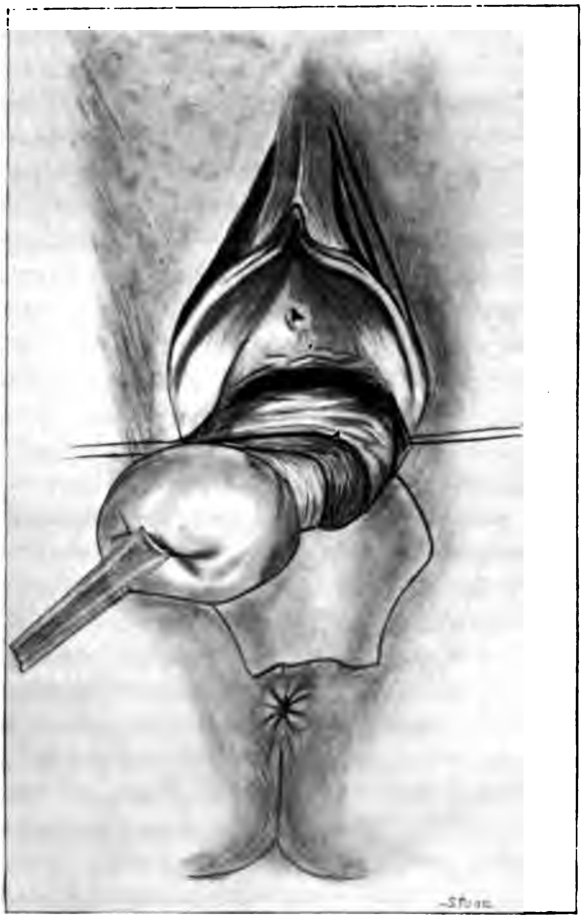


FIG. 68.—High amputation of cervix. Cervix drawn down with volsella and a circular incision made through the vaginal mucosa, which is stripped back to a point near the internal os.

In uterine prolapse in child-bearing women, the procedure should be a curettage, amputation of the cervix, an anterior colporrhaphy, with separation and elevation of the bladder; and the intra-abdominal shortening of the round ligaments to carry the fundus forward, and of the uterosacrals, to raise the cervix upward and carry it backward.

When the woman is past the child-bearing period or may be sterilized, and the uterus is small, transposition of the uterus, after first amputating the cervix should it be hypertrophied, will give satisfactory results. On the other hand, should the uterus be large, plastics should be made on the anterior and posterior vaginal walls, and a supracervical hysterectomy done from above, supporting the

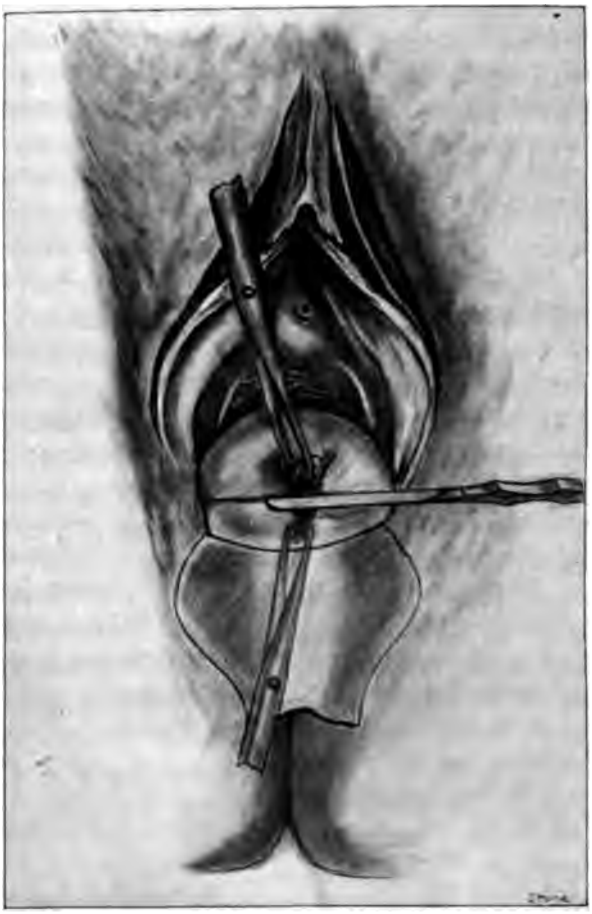


FIG. 69.—Cervix split transversely beyond the limits of the tear, after ligation of the vaginal branch of the uterine artery.

cervical stump by suturing the broad and round ligaments into it, or in case these are too much atrophied the cervix may be fixed in the lower angle of the abdominal wound.

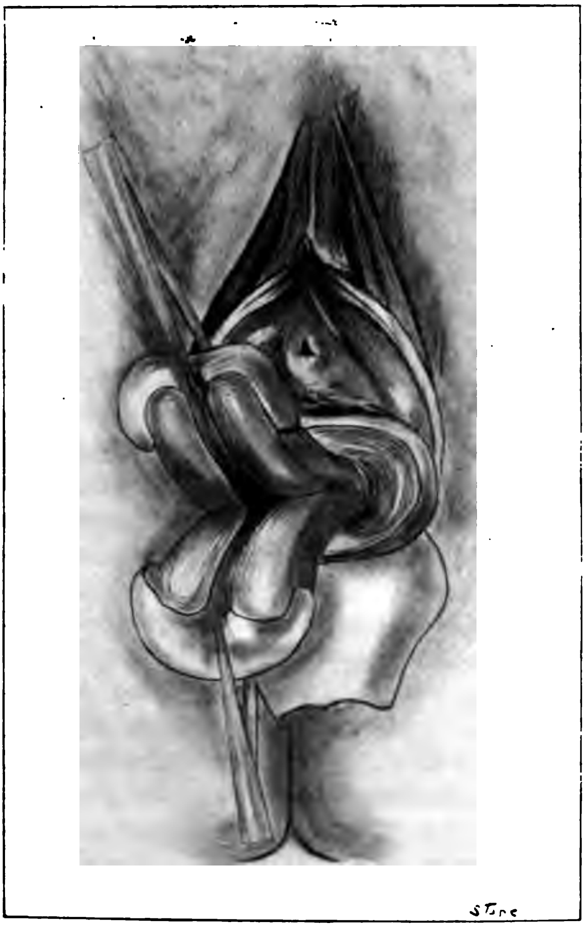


FIG. 70.—Showing cervix split and held open just before amputating the lips.

The Technic of Amputation of the Cervix.—With the patient placed in the lithotomy position and the vulva and vagina sterilized with 3 per cent solution of the tincture of iodine, the perineum is retracted with a weighted speculum and the cervix drawn down with traction forceps, the os is cleared of mucus, and the cervical canal sterilized with tincture of iodine; the uterus then should be thoroughly curetted with a sharp curette and the curettings examined, after which a circular incision is made through the vaginal mucosa, just below the cervicovaginal junction. The mucosa is dissected up by blunt dissection, so as to expose the entire infravaginal portion of the cervix (Fig. 68); it is then split longitudinally on each side to a depth of an inch and a half (Figs. 69 and 70). Bleeding may be controlled by a suture ligature placed on each side of the uterus, ligating the

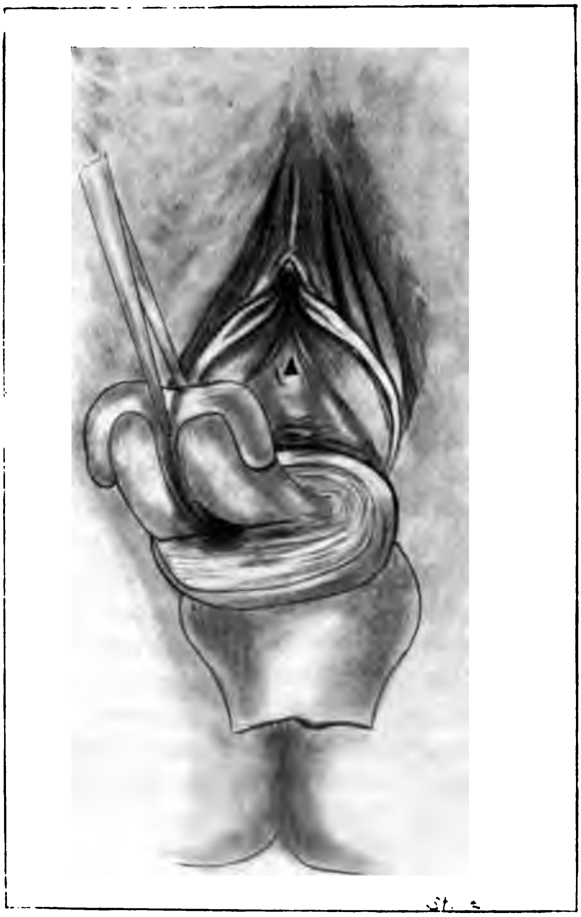


Fig. 71.—Posterior lip amputated.

lower branches of the uterine artery; a wedge-shaped excision is now made from each lip, taking care to preserve a flap of cervical mucosa (Fig. 71). Each flap of vaginal mucosa is sutured to the mucosa of the cervical canal with two or three sutures of ten-day chromic catgut (Figs. 73 and 74). The gaping intervals in the vaginal mucosa on either side, which persist after the canal is thus formed, are then closed with interrupted sutures of chromic catgut, each suture engaging a portion of the underlying cervical tissue, to

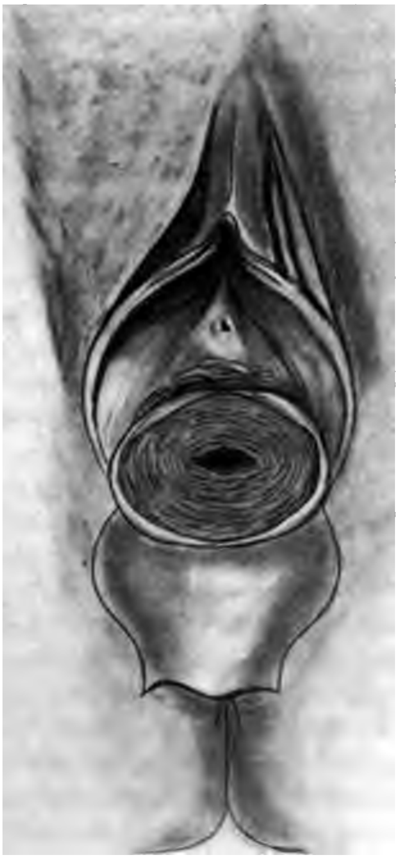


FIG. 72.—Amputated stump showing cervical canal.

prevent dead spaces, control hemorrhage, and close the cervical incision (Fig. 75). The sutures should be sufficiently tight to make perfect coaptation without tissue constriction; if too tight a ragged stump results. If the work is properly done the stump is smooth and symmetrical (Fig. 76).

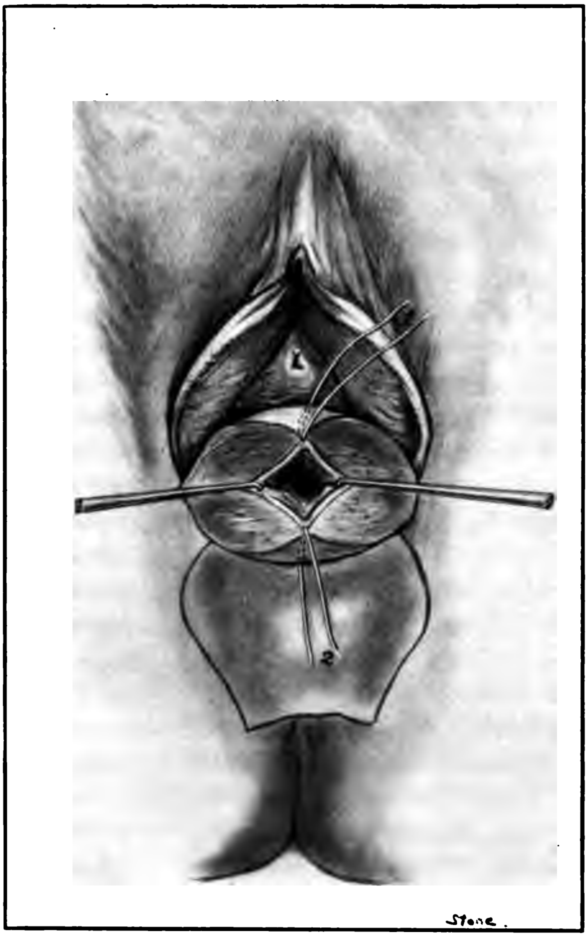


Fig. 73.—Suture of cervical mucosa to vaginal mucous membrane, while stump is drawn down with tenacula.

Shortening of the Uterosacral Ligaments.—*Technic of the Vaginal Operation.*—The posterior lip of the cervix is drawn down and held well forward with volsella. A median antero-posterior incision is made in the posterior vaginal fornix, through all the tissues except the peritoneum. Each ligament is exposed and dissected out. The ligaments may be located by the sense of touch as downward and forward traction is made upon the cervix. A loop of each ligament is then drawn down with a blunt hook and the base of the loop closed with a single mattress suture of chromic catgut, while the end of each loop is sutured to the cervix just below the insertion of the uterosacral ligament into the uterus. The vaginal wound is closed with a running suture.

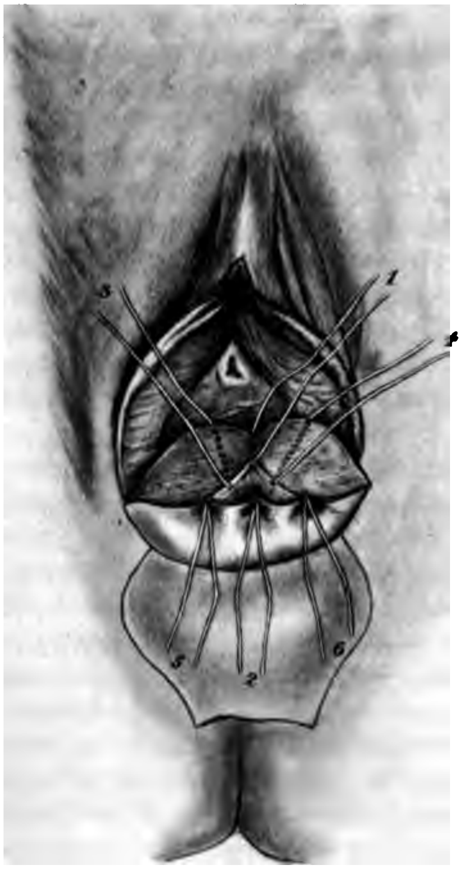


Fig. 74.—Making the new external os.

Shortening the Uterosacral Ligaments by the Abdominal Route.—*Technic.*—With the patient in an extreme Trendelenburg posture, the abdomen is opened through a median or Pfannenstiehl incision and the uterus is drawn forward over the pubis to expose the ligaments. Each ligament is grasped in the middle third with a Kocher forceps and lifted up, while a suture of No. 2 chromic catgut is passed through the end of the loop, through the uterine tissue, just above the point of the ligamentous insertion, and then through the opposite loop. When this is tied the cervix is drawn backward

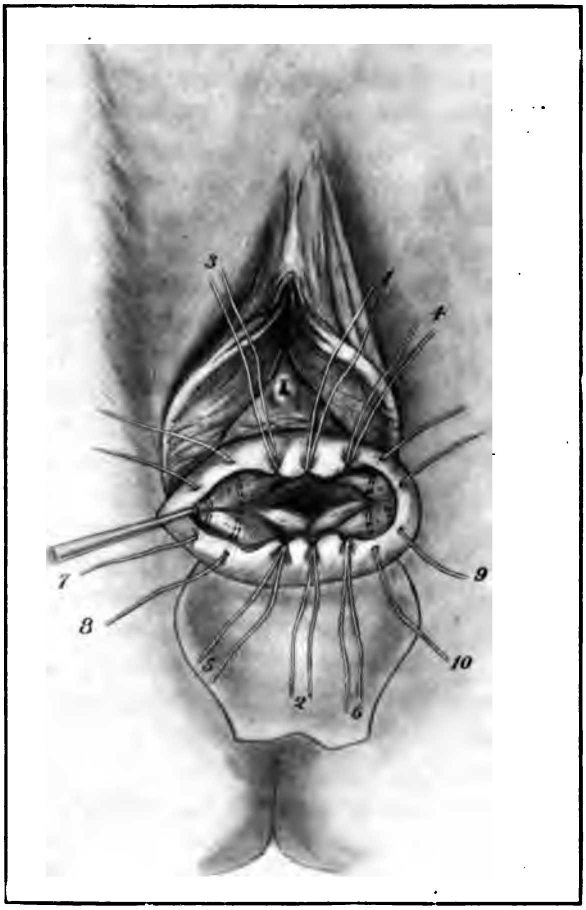


Fig. 75.—All sutures in place.

(Noble). Dissection of the ligaments is unnecessary and exposes the patient to the dangers of greater trauma and infection.

Transposition Operation.—The operative field is sterilized by painting over the surfaces of the vulva, the adjacent skin, vaginal mucous membrane and cervix, with a one-half strength solution of the tincture of iodine; the cervix is then grasped with a volsellum and pulled downward and backward, while a "guy rope" of heavy silk is placed in the vaginal wall, just behind the meatus. Traction

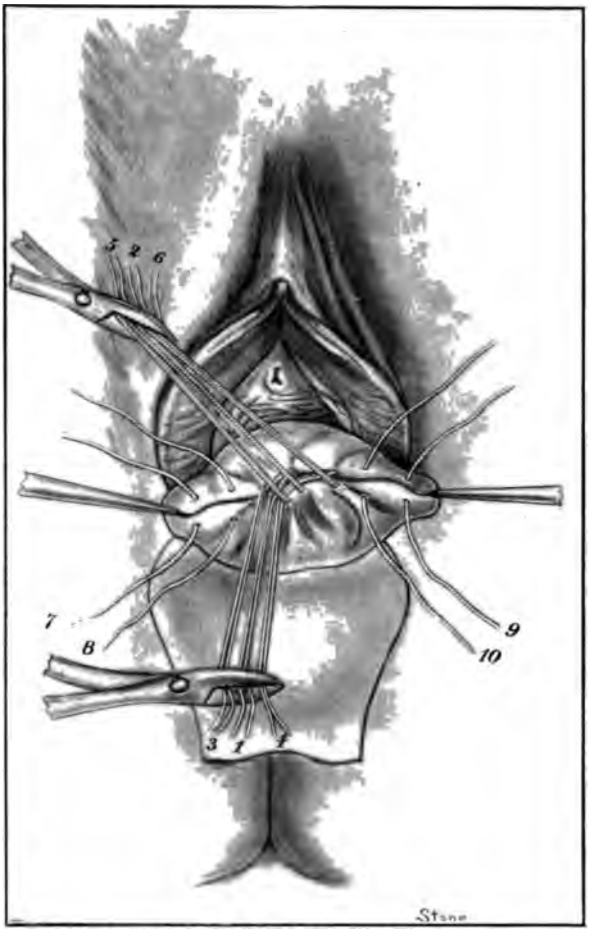


FIG. 76.—Canal sutures caught in clamps are crossed to coapt wound edges while sutures are being tied.

on these two fixed points puts the anterior vaginal wall on the stretch; it is now picked up between two mouse-toothed forceps, one on each side of the median line just in front of the cervix, and an incision made with the scalpel through the mucosa, a large pair of blunt-pointed Mayo scissors curved on the flat, is passed through the incision and gently pushed parallel to the taut vaginal wall, between the vagina and the bladder, to a point just behind the meatus; the blades are then opened and the bladder is separated from the vaginal mucous membrane. With a pair of straight scissors the vaginal mucosa is cut through in the line of separation, the edge of the wound on each side is now grasped with a pair of ring forceps and everted from the bladder and the front of the uterus and broad ligament. This is best done by blunt dissection with the thumb covered with dry gauze. The bladder is then pushed off in the same way from the front of the uterus, which exposes the vesicouterine reflection of the peritoneum. With the bladder held forward with a suitable anterior retractor, the vesicouterine pouch is opened, and after releasing the volsellum on the cervix, the uterus is drawn forward under the bladder with a "uterine climber." With the uterus in this position, a smooth-pointed full curved needle armed with No. 2 chromic catgut is passed through the subpubic ligament, just to the side and below the urethra, then through the anterior fundal wall below the level of the round-ligament insertion, and out through the vaginal wall, at a point corresponding to the point of entrance. If this suture is properly placed, it lays the fundus on a plate of fascia just behind the pubis. With this suture held taut the cervix pushed back and the perineum retracted with a Sims' speculum the excess of vaginal mucous membrane is cut away and the incision in the vaginal wall closed by passing interrupted catgut sutures at about one-half inch intervals, through the mucosa, the anterior fascial plate, and the anterior uterine wall, until the entire incision is approximated. By including the uterine wall in each suture all of the dead space is obliterated and the hemostasis is made more perfect. Interrupted sutures should be used rather than a continuous one *in order that the length of the vagina may be preserved and not shortened;* this throws the cervix further backward toward the sacrum. Interposition or transposition of the uterus should be supplemented by a high restoration of the pelvic floor, in which a special effort is made to bring out the levatores ani muscles. Transposition or interposition of the uterus should be limited to women who are suffering from uterine prolapse in whom cystocele is the most prominent lesion and who are past the menopause, or in whom the tubes have been tied; where the uterus is small and the *postpubic attachments of the urethra have not been injured.* Where there is difficulty in keeping the cervix in its posterior position the uterosacral ligaments may be brought in front of the cervix to carry it well back toward the sacrum.

Interposition of the uterus will fail to cure prolapse unless the following points are observed in operating and in the after management:

1. The cervix must be carried well back into the hollow of the sacrum and held there.
2. The body must be brought into anteversion, the anterior fundal wall lying on the pubic shelf.
3. This relation must be maintained by the construction of a firm pelvic floor support, and the vagina must not be shortened.
4. The intra-abdominal pressure must be relieved by the use of a properly fitting belt or supporting corset.

Hysterectomy and hysterocolpectomy may be employed for the cure of prolapse in exceptional cases, in women who have passed the menopause. Especially is this applicable in those cases where the uterus is large and the inversion of the vaginal walls is complete.

INVERSION OF THE UTERUS.

In inversion, the uterus is turned partially or wholly inside out. Inversions may be divided because of their etiology into:

1. Puerperal inversions.
2. Inversions due to tumor formations.

Causes.—Inversion is usually a puerperal lesion, occurring during or immediately following the third stage of labor when the lower uterine segment and cervix are widely dilated. About 50 per cent occur spontaneously. *Only about one-tenth of the cases are of the chronic type.* It most frequently follows relaxation of the uterus and faulty manipulation of the fundus in the third stage of labor. The relaxed area, usually the placental site, when near the fundus

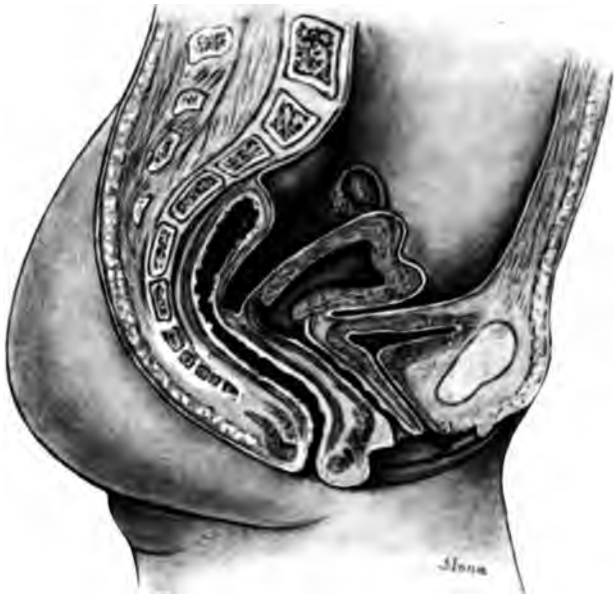


Fig. 77.—Dent at the fundus of the uterus. Depression of placental site.

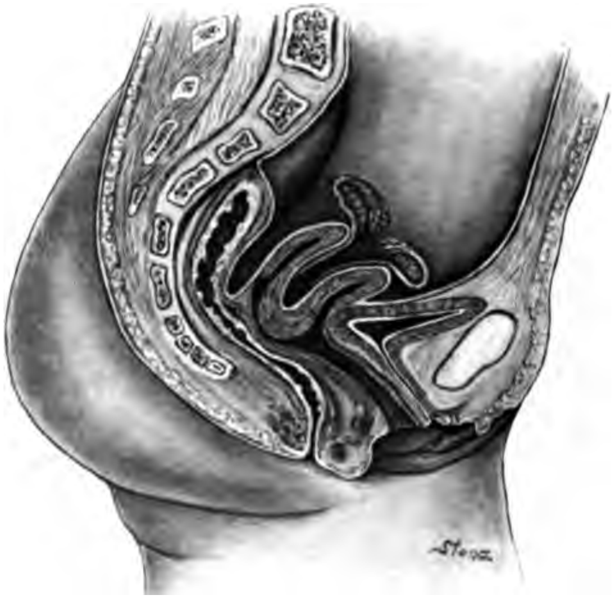


Fig. 78.—Partial inversion of the uterus.

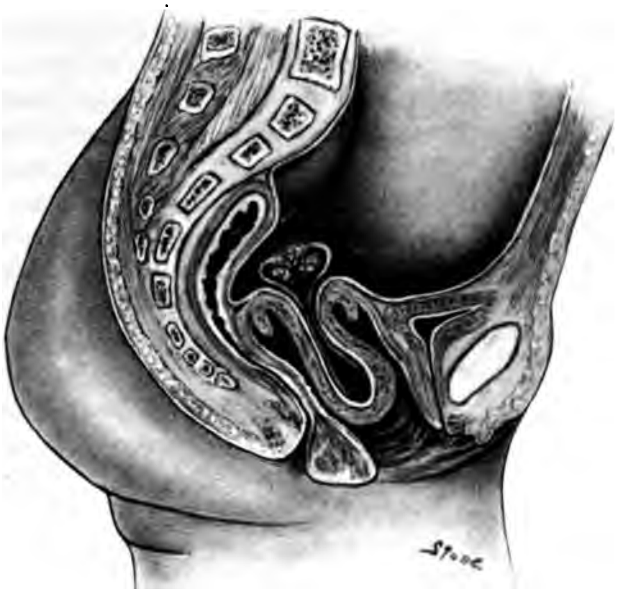


FIG. 79.—Complete inversion of the uterus body within the vagina.

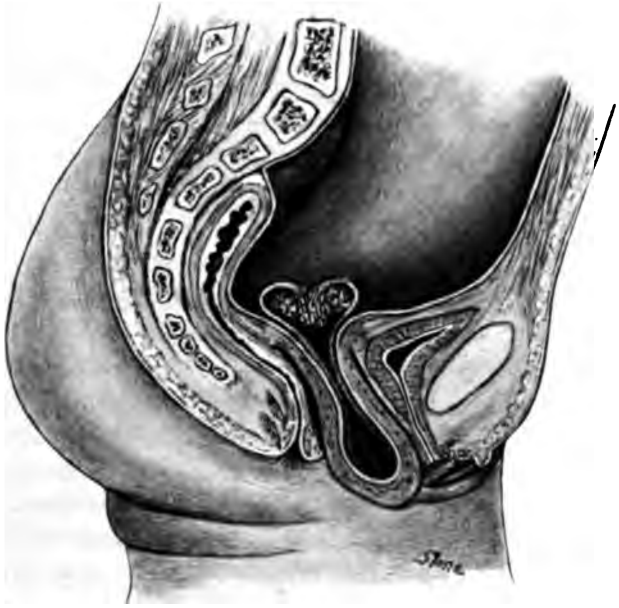


FIG. 80.—Complete inversion of the uterus.

sags down into the uterine cavity, and is extruded by the surrounding contracting uterine muscle and depressed further and further downward as a foreign body, until the inversion is partial or complete, which depends largely upon the patulousness of the cervix. Extreme intra-abdominal pressure, an adherent placenta, or a fundal placental seat may contribute to the accident.

Tumors situated in the fundal wall near either cornua in a relaxed subinvoluted uterus are a common cause of chronic inversion.

The uterine contractions evolve them into the cavity, from whence they are forced through the cervix by the contractions of the uterus, and carry the inverted fundus with them. Inversion seldom occurs independently of either postpartal conditions or an intrauterine tumor.

Degrees of Inversion.—(1) Partial, where the fundus lies within the uterine cavity. (2) Complete, where the womb is turned completely inside out; the inverted uterus lying in the vagina or without the vulvar orifice, dragging the tubes and part of the ovarian, round and broad ligaments into the depression.

Symptoms.—Acute inversion of the uterus occurs suddenly and is usually followed by profound shock, severe abdominal pain referred to the hypogastrium, more or less profuse hemorrhage and rectal and vesical tenesmus; *while in the chronic inversion*, which is of slow development, there may be few or no symptoms, except metrorrhagia and vesical irritability.

Diagnosis.—The diagnosis of acute inversion can be made with certainty by physical examination. A tumor is found in the vagina or protruding from the vulva; and there is absence of the body of the uterus from the abdomen.

In acute cases, the inverted uterus forms a large pear-shaped tumor occupying the vagina or protruding from the vulva, to which the placenta may still be adherent, constricted at its narrowest portion by the contracted cervical ring. The orifice of the uterine tubes may be made out. The tumor mass is soft and vascular.

In partial inversion the funnel-shaped depression at the fundus may be recognized by palpation through the abdominal wall, while in complete inversion rectoabdominal examination demonstrates the presence of a funnel or cup-shaped depression at or above the usual position of the cervix.

In women with extremely fat abdominal parietes, the absence of the fundus from the abdomen may be demonstrated by the finger in the rectum and a sound in the bladder. Chronic inversion has to be distinguished from a uterine polyp, which has been delivered through the cervix. The symptoms are similar in both conditions; *physical signs alone make the differentiation.*

The introduction of the finger into the vagina reveals a smooth pear-shaped tumor which bleeds on manipulation. On inspection the endometrium covering the tumor mass is dark red and swollen, or if the inversion protrudes from the vagina the mucosa may become hard and ulcerated. A cervical ring or collar surrounds the narrowest portion of the tumor and the sound cannot be passed at any point beyond the upper edge of the cervical ring.

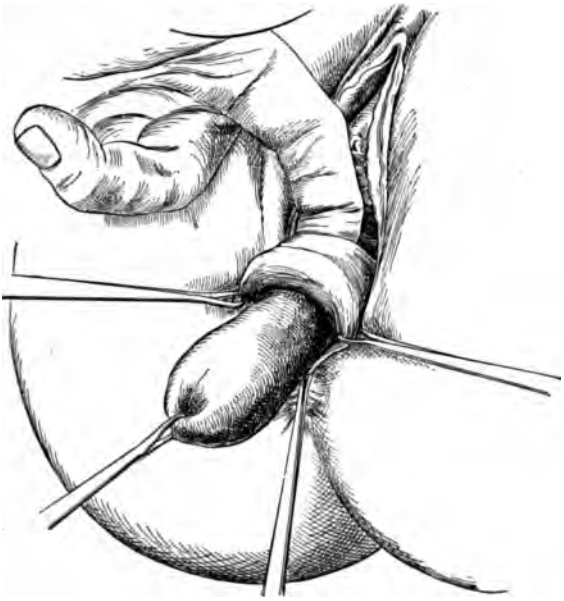


FIG. 81.—Diagnosis of chronic inversion of the uterus by Ashton's method. Note the position of the tip of index finger.

By rectoabdominal examination, both the absence of the fundus above and the funnel-like depression may be demonstrated.

Ashton's method of making a positive diagnosis in chronic inversion is as follows: The cervix is seized with three bullet forceps and drawn into the vulvovaginal orifice; the protruding tumor, supposed to be the inverted fundus, is then caught with the bullet forceps and strong traction made upon it, while the anterior vaginal wall is depressed with the index finger, and if the uterus is inverted no resistance is offered, and the finger-tip may be *pressed into the cervical rim from above* (Fig. 81).

In uterine polyp the body and fundus of the uterus are in their normal position; the tumor is often irregular in shape, and the sound may be passed into the cavity to the fundus, being only obstructed at the point at which the pedicle of the tumor is attached. *Some degree of inversion often complicates the extrusion* of a uterine polyp.

Prognosis.—In acute inversion the prognosis is grave, as death may occur from hemorrhage, shock or sepsis. The mortality is estimated at 30 per cent. Early reduction of the inverted uterus materially improves the prognosis. In chronic inversion the mortality is not high, but the condition seriously impairs the patient's general health by continuous uterine bleeding, producing a secondary anemia which reduces the woman's resistance and favors infection from operation. Again, early recognition and reduction improves the prognosis.

Treatment of Acute Inversion.—*Immediately after the accident reduction is seldom difficult.* The patient having been anesthetized, and in the lithotomy posture, the operator places one hand on the abdomen over the inverted uterus for counter-pressure, at the same time using the fingers of this hand for dilatation of the cervical ring he cones the fingers of the other hand and passing them into the vagina, applies the finger-tips to the inverted fundus. In some cases it is best to make the upward pressure at one cornu, over the entrance of one Fallopian tube, while in others the pressure should be made over the central portion of the fundus. With the fundus once fairly indented, complete reduction is easily effected. The upward force must be directed in the axis of the superior strait and to one side of the sacral promontory. After reduction is accomplished the hand is held within the uterus until the contractions force it out, when the uterine cavity and vagina should be packed with iodoform gauze until retraction is established.

When the placenta is adherent the operator should replace the uterus with the placenta attached; when it is partially detached he should separate and remove it before trying taxis. *Rigorous aseptic precautions must be observed to prevent sepsis.*

Treatment of Chronic Inversion.—The treatment of chronic inversion may be considered under (1) *Palliative Measures* and (2) *Operative Procedures.*

Palliative Measures.—Palliative measures consist in placing the patient in bed in a moderate Trendelenburg posture and the use of hot vaginal douches twice daily to reduce the pelvic congestion, which may be supplemented by a firm vaginal tamponade with sterile gauze saturated with boroglyceride. After the employment of these preparatory measures for a week or ten days, gradual replacement may be attempted by making gradual upward pressure on the fundus; by repeated tamponing of the vagina; or by the Braun colpeurynter or Avelings ingenious repositor.

In the writer's practice, however, all of these methods have been supplanted by vaginal hysterotomy.

Operative Procedures.—Operative procedures for the treatment of chronic inversion are: Vaginal hysterotomy and vaginal hysterectomy.

Vaginal Hysterotomy.—*Technic.*—The patient should be anesthetized and placed in the Edebohls' position and when the vulva and vagina are carefully disinfected with one-half strength tincture of iodine. The fundus uteri is grasped and drawn well down with the volsella. The anterior vaginal wall is caught with a mouse-toothed forceps in the median line just above the anterior lip of the cervix and held strongly upward. Through the vaginal wall thus made tense, a transverse incision about two and a half inches in length is made close to the cervix. By making strong traction on the cervix with two Jacob's forceps placed *on either side of the median line, the bladder may be peeled off the front of the inverted uterus by blunt dissection* and held out of harm's way by a suitable retractor, and the peritoneum opened into at the vesicouterine pouch. The anterior lip of the cervix is thus exposed and incised longitudinally between the two Jacob's traction forceps. If necessary the incision may be extended nearly to the fundus.

The uterus is now easily reinverted and the uterine cavity packed with a sterile gauze. A wedge-shaped piece of uterine musculature and mucosa may be removed on either side of the incision to reduce the uterine bulk and the incision is closed from above downward with interrupted sutures of chromic catgut. After closing the uterine wound, the upper end of each round ligament is sutured across the anterior uterine wall to prevent retroversion of the uterus. Incision of the cervical ring posteriorly as suggested by Gilliam does not afford the facility for detailed surgical work as does the anterior uterine incision.

When the prolapsed portion of the inverted uterus is the seat of ulcerative or gangrenous changes, excision of the prolapsed portion should be elected. The inverted portion may be amputated with the electric cautery knife which seals the avenues of infection.

The inverted fundus may be seized with traction forceps placed on either side of the median line, and the cervical ring caught with four pairs of bullet forceps and pulled down to the vulvovaginal orifice; the fundus is then carefully incised antero-posteriorly between the traction forceps, and the finger introduced through the opening to free the inverted peritoneal pouch of adhesions and prolapsed intestines. When it is certain that the cavity is empty, the incision is extended until the fundus and the body of the uterus are divided into two *lateral halves* as far as the internal os uteri; each half is drawn out laterally, which exposes the inverted broad ligaments, tubes and round ligaments.

A heavy catgut ligature threaded in a full-curved, smooth, pointed needle is passed at the internal os, through uterine tissue, under each broad ligament and tube, and securely tied; this secures complete hemostasis. Three silkworm sutures are then passed transversely through the body of the uterus, about one-quarter of an inch from the internal os, and the inverted portion amputated just below them. The sutures which close the opening in the cervix are then tied and the peritoneal cavity thus shut off. The sutures are removed at the end of two weeks and the patient allowed out of bed.

CERVICAL LACERATION.

A laceration of the cervix is a rent or tear in the cervical tissue of the uterus.

Frequency.—Lacerations of the cervical rim are very common, for some degree of cervical laceration takes place in nearly all primiparous labors; and practically all women sustain some injury to the cervix during the passage of the child, hence the external os is widened and exposure of the cervical canal is commonly present in the parous woman. Only about 50 per cent of such lacerations remain as actual clefts in the cervical rim.

Causes.—The chief causes of extensive cervical lacerations are forcible dilation, untimely artificial delivery by forceps or breech extraction, dry or precipitate labor through passages incompletely prepared.

Rigidity of the cervix as is found in old primiparæ, malignant infiltration, and hyperplasia predispose to cervical injury.

Instrumental dilation of the non-gravid uterus with steel-branched dilators with incidental infection is a frequent cause of tears which result in endocervicitis, etc. A large proportion of interpartal tears are insignificant and heal spontaneously. Failure of union *is due to the incidence of infection* which prevents healing by first intention, granulation takes place and a cicatrix forms in the angle of the tear permanently altering the shape of the cervix.

Varieties and Degrees.—Lacerations may take place at any point in the circumference of the cervical rim, although they usually occur in one or both lateral aspects. The injury may be:

Unilateral when the tear extends through only one side.

Bilateral, when it is through both sides.

Stellate or multiple, when the tear goes in three or more directions.

Tears of the cervical tissues of the portio vaginalis without going through the portial *mucous membrane are incomplete. Complete tears* sever all of the tissues of the cervical rim at the point of the injury.

Bilateral tears are the most frequent; the more extensive injury usually occurring on the left side. When the laceration is unilateral, the rent is commonly on the left side, owing to the great predominance of left positions of the vertex. The rent may extend to or beyond the vaginal junction, or into the adjacent parts, involving the bladder, the base of the broad ligaments or the retrouterine structures.

Pathological Changes in the Torn Cervix.—Nearly one-half of all cervical lacerations heal spontaneously; when this does not occur, *pathological changes which are largely the result of infection take place.* These changes are marked in tears which extend beyond the vaginal junction. For in healing by granulation a mass of scar tissue develops in the angle, involution ceases, and the cervical structures become congested, hypertrophied, hard, and indurated; the cervical glands become infected, and the lips roll outward, everting the cervical mucosa exposing it to irritation, the epithelium rapidly proliferates and actually pushes itself out on the vaginal aspect of the cervical rim, and the torn surfaces present a red, swollen and angry appearance.

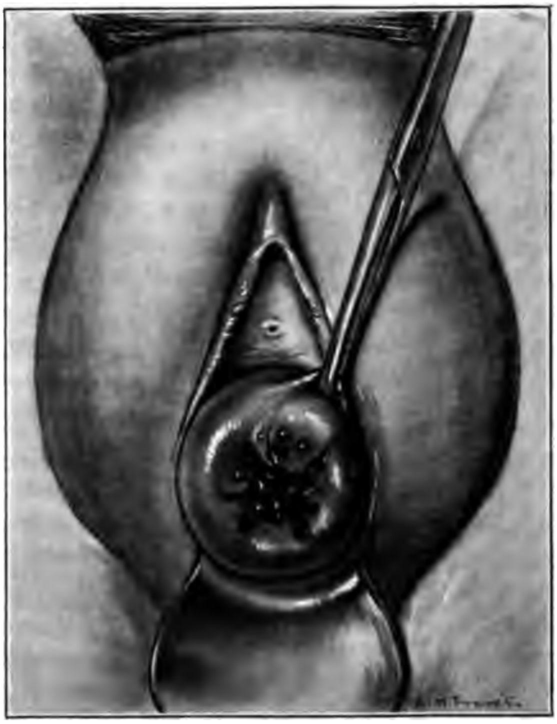


Fig. 82.—Lacerated cystic cervix, multiple tears.

In the so-called *erosion which is in reality a new cell formation, an overgrowth of lymphoid tissue,* the Nabothian glands are increased in their activity, while owing to the tissue hyperplasia their ducts are occluded by the scar tissue formation and cysts develop (retention cysts containing glary mucus).

The angle of the tear becomes filled with a plug of scar tissue, which in turn produces a permanent ectropion or rolling out of the cervical lips. The accompanying endocervicitis is apt to produce a hypersecretion of mucus from the ovula Nabothii or the infection may extend to the uterine lymphatics and the cellular tissue in the broad and uterosacral ligaments with a resulting metritis and parametritis. Subinvolution metritis and corporeal endometrial hypertrophy are common complications due to the venous stasis.

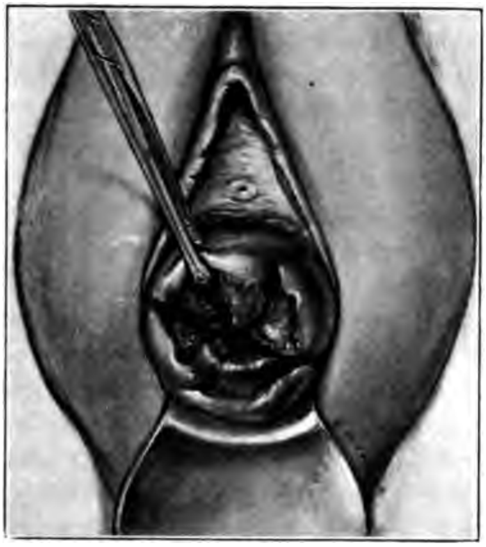


FIG. 83.—Multiple laceration of the cervix with ectropion of the cervical mucosa.

Symptoms.—Occasionally there are no symptoms; those that are present are due to the lesions caused by the laceration. The commonest symptom is a leucorrheal discharge. The mucoid leucorrhea or mucopurulent discharge, which accompanies the pathological changes in the cervical tissues, is due to the coexisting endocervicitis.

The menorrhagia results from uterine enlargement or coincident displacement which in turn induce a circulatory stasis causing the but the accompanying lesions are apt to persist to a greater or less degree.

Treatment.—The treatment is: (*a*) Preparatory, to reduce the size of the cervix and cure the cervical infection; (*b*) operative to restore the normal contour of the cervix or to remove the diseased structures when the pathology is extensive.

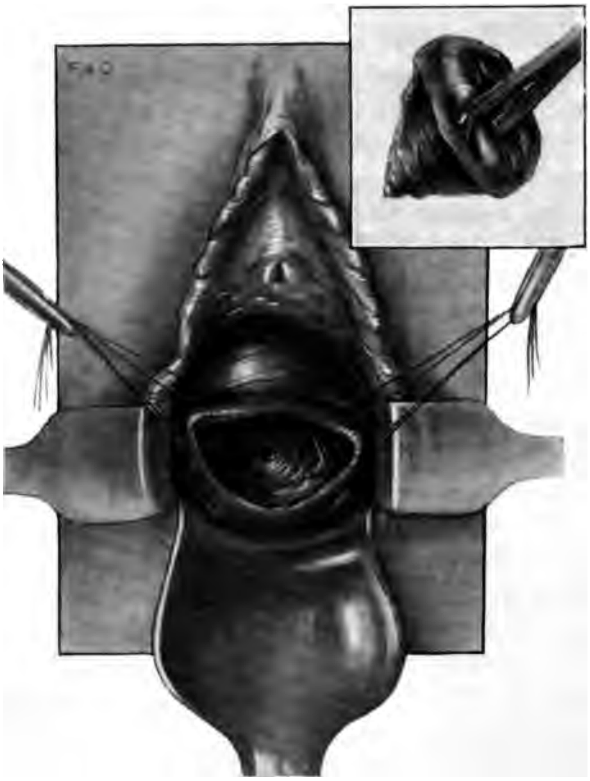


FIG. 85.—Tracheloplasty, showing the wedge excised in excision.

All cervices which need to be repaired by operative means should be subjected to a preparatory course of local treatment by means of blood-letting, destruction of cystic accumulations, boroglyceride tampons, hot douches, etc., previous to operation. By these means the cervical tissues are placed in a condition which favors union by first intention.

Special attention should be given to the general health, by the use of a supporting diet, tonics, exercises, digestives, and regulation of the bowels.

Operative.—It is well to operate on all lacerations which are complicated with *induration and hypertrophy of the cervical tissue, extensive eversions of the intracervical mucous membrane, cystic degeneration and erosion,* and also on those lacerations which are responsible for subinvolution, endometritis, and uterine displacements, as well as those with a sensitive plug of scar tissue in the angle of the wound.

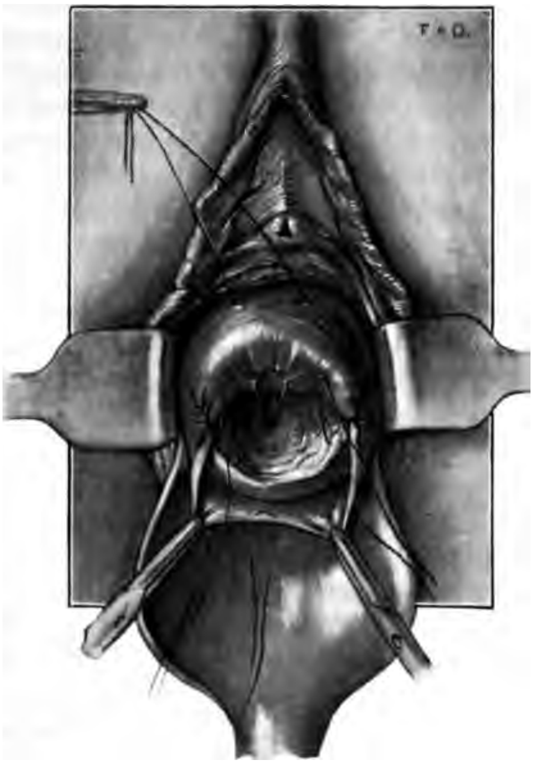


FIG. 86.—Trachelоplasty, placing the stitches which invert the vaginal mucosa attaching it to the cervical mucosa.

When operating upon a cervical injury a completed reconstruction of the pelvic structures should always be done, *i. e.*, restore the pelvic floor, repair the cervical injury, and reduce the uterine enlargement and correct the malposition if one is present.

The operation may be either trachelectomy, tracheloplasty or trachelorrhaphy.

An amputation should be done:

1. In stellate lacerations.
2. In tears with great loss of tissue.
3. Where there is cervical induration or hyperplasia.
4. In the presence of marked cystic degeneration.
5. Where there is extensive erosion.

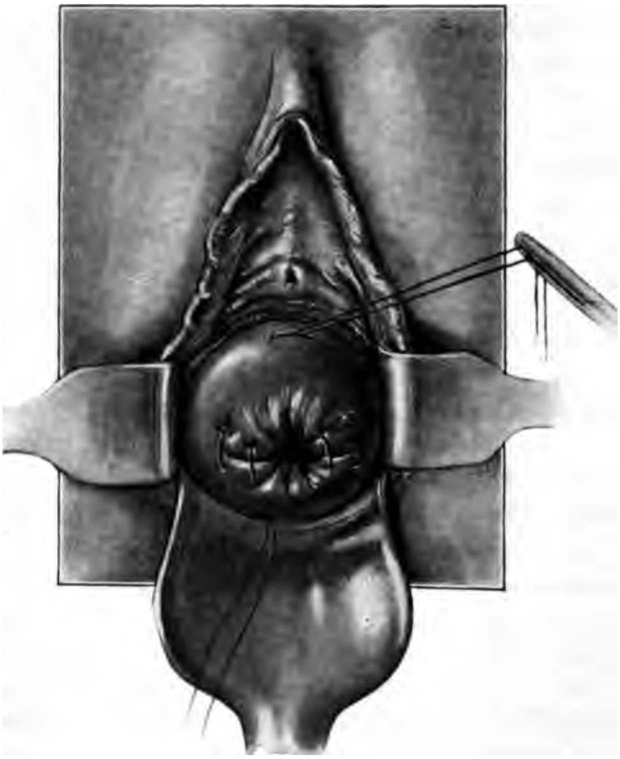


Fig. 87.—Tracheloplasty, completed operation.

In all other conditions tracheloplasty trachelorrhaphy should be elected.

Operation of Trachelorrhaphy.—*Technic.*—With the patient anesthetized and placed in the lithotomy or Edebohls' posture, the cervix is exposed with a perineal retractor; the cervix is then drawn forward with volsella, one caught in each lip, in the median line, and if there is evidence of endometrial hypertrophy the uterus should be dilated and curetted. The cervix is next split with knife or scissors to the primary limit of the tear, when an area of denudation corresponding with the torn surface is outlined with a special knife and denuded with knife or scissors curved on the flat (Fig. 88).

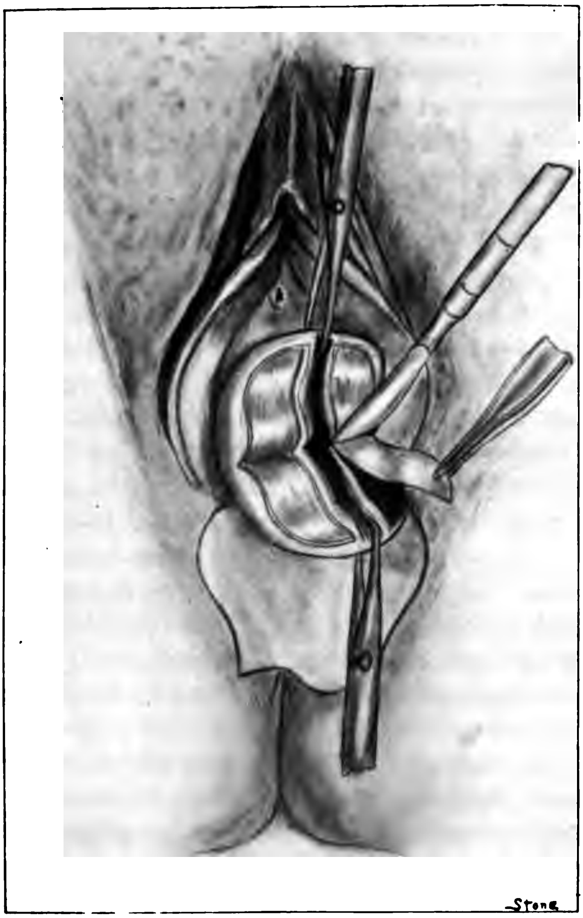


FIG. 88.—Denudation of everted lip of cervix, leaving mucosa for cervical canal.

Care is taken to avoid removing vaginal or cervical mucosa beyond the torn surface; all scar tissue must be removed from the angles of the tears (Fig. 89).

Coaptation of the denuded surfaces is effected with sutures of No. 2 chromic catgut. The first suture threaded on a spear-pointed curved needle is passed at or above the upper angle of the tear on one side, from the vaginal mucosa through the muscle, and

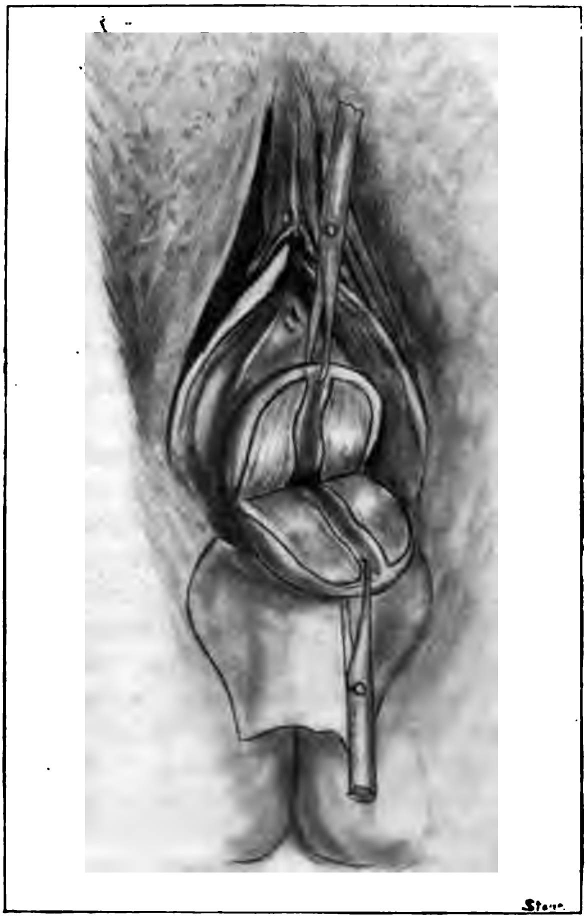


FIG. 89.—Denudation completed.

just short of the intracervical mucosa, reëntering the muscle at a corresponding point on the opposite lip and passing through the vaginal mucosa (Fig. 90). The sutures are placed at intervals of about one-third of an inch until the tear is closed. A similar procedure is employed on the opposite side.

The direction of each suture is such that, when tied, the loop shall be nearly circular. The sutures are tied as they are introduced, care being taken to secure coaptation without constriction. In unilateral lacerations, the suturing is done *practically on one side only*. The contour of the cervix, however, is better preserved by splitting it on both sides to a point on a level with the limit of the tear; in other words, transforming a unilateral laceration into a bilateral injury; in this way the proper direction of the cervical canal may be maintained.

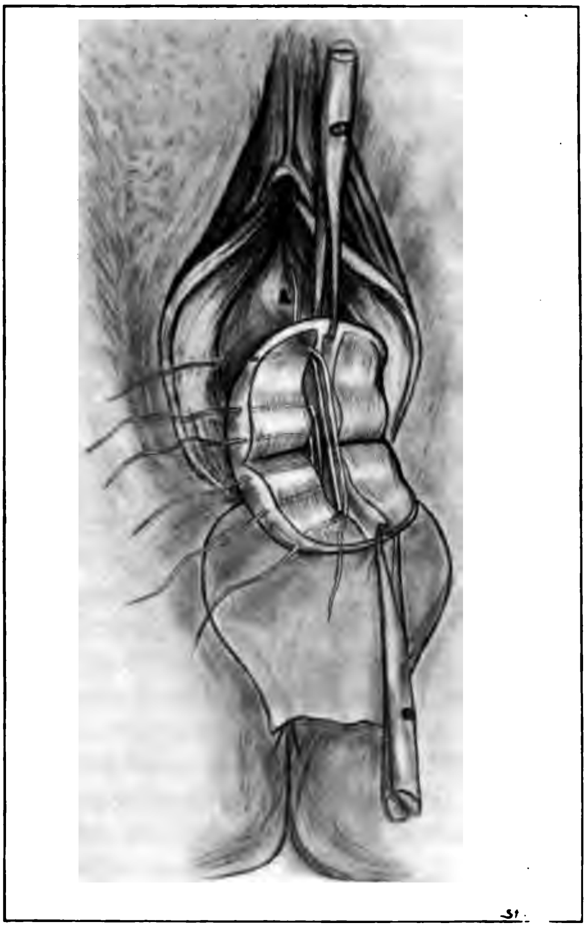


FIG. 90.—Position of sutures, lips held apart with volsella.

A vaginal pack of iodoform gauze is introduced and allowed to remain in place for forty-eight hours; no douching is necessary. The patient may be allowed out of bed in ten days.

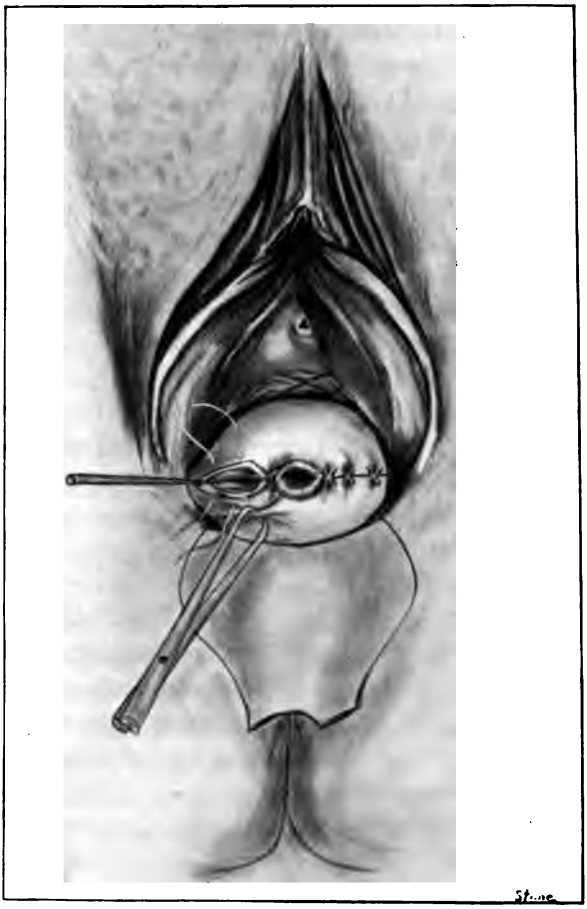


FIG. 91.—Coaptation of cervical wound, tenaculum in right angle.

INFRAVAGINAL HYPERTROPHY OF THE CERVIX.

Infravaginal hypertrophy of the cervix, is hypertrophy of the cervical tissues below the vaginal junction, a hypertrophic elongation of the portio vaginalis, so that the distance from the external os to the vaginal fornices is considerably increased. The overgrowth may be so great as to protrude from the vulva. The vaginal cervix is long, soft, and conical, and lies in the axis of the vagina, while the body of the uterus is usually anteverted or anteflexed and in its proper pelvic plane and pelvic relation. Infravaginal hypertrophy is almost always congenital and is seldom met with *except in virgins or sterile women.* In prolapse of the uterus cervical hypertrophy with elongation of the portio is more apparent than real—the degree of hypertrophy can always be determined by placing the patient in the knee-chest posture, and measuring the vaginal portion.

Symptoms.—Hypertrophy may exist without producing any symptoms referable to the genitals. It seldom produces dysmenorrhea, but the elongated cervix frequently *becomes the seat of an endocervicitis,* which may extend to the cellular tissues in the uterosacral ligaments and *produce lumbosacral pain.* The increased uterine congestion may prolong the menstruation. Sterility nearly always exists, and sexual intercourse may be mechanically interfered with, or when the condition is complicated with a uterosacral cellulitis dyspareunia is complained of. Should the elongation be so great as to protrude from the vulvar orifice, considerable difficulty and discomfort may be experienced in walking, and the protruding cervix may become inflamed from constant external irritation.

Diagnosis.—The diagnosis is readily made by vaginal touch, which reveals the elongated conical cervix in the vaginal axis, while on bimanual examination the uterine body and fundus are found in their proper position. The diagnosis may be confirmed by inspection with the patient placed in the knee-chest position when the cervix is seen protruding deeply into the vagina, notwithstanding that the entire uterus is carried up in the pelvis when the vagina becomes distended with air. This condition must be differentiated from prolapse of the uterus. The following are the chief points of differences.

INFRAVAGINAL HYPERTROPHY.	PROLAPSE.
Occurs in virgins and sterile women.	Commonly in women who have borne children.
No evidence of cervical or perineal laceration.	Pelvic floor and cervix usually the seat of extensive injury.
Cervix elongated and conical.	Cervix generally enlarged, edematous, not conical.
Knee-chest position does not lessen the length of the cervix.	Knee-chest causes an apparent shortening of the cervix.
Vaginal vault is normal.	Dome of the vagina obliterated.
There is usually no relaxation of the vaginal walls.	There is evidence of relaxation of the vaginal walls.
The body and fundus are in their normal position.	The body and fundus are in a lower plane.

Treatment.—The treatment is surgical. The elongated cervix should be amputated at the uterovaginal junction.

SUPRAVAGINAL HYPERTROPHY OF THE CERVIX.

In a hypertrophy of the cervical tissues above the cervicovaginal junction, there is a marked increase in the length of the cervix between the vaginal vault and the anterior and posterior reflexes of the peritoneum. It is seldom met with in parous women, being almost exclusively limited to virgins and sterile women. It produces inversion of the vaginal walls, simulating prolapse. The symptoms are essentially those of uterine prolapse.

Treatment.—The treatment is high amputation of the cervix.

DISORDERS OF MENSTRUATION.

Amenorrhea.—*Amenorrhea is an absence of the menses during* the reproduction period from puberty to the menopause and may be classified as (*a*) physiological, (*b*) primary and (*c*) secondary.

Physiological Amenorrhea.—Cessation of menstruation is physiological during certain periods of a woman's life. Menstruation is absent before puberty and after the climacteric, and is usually absent during pregnancy, the puerperium, and the lactation period.

Primary Amenorrhea (Emansio Mensium).—Primary amenorrhea includes those cases in which menstruation has never occurred and is commonly due to congenital causes or anatomical defects as genital atresia or to the absence or faulty development of the ovaries or uterus or both. When due to atresia menstruation may occur regularly, but the flow is concealed owing to the obstruction, and the menstrual blood accumulates behind the atresia, forming a hematocolpos, hematometra, or hematosalpinx, as it successively distends the vagina, uterus, and tubes. When these conditions obtain the patient usually suffers severely from the general phenomena of menstruation—the menstrual molimena—on the other hand the ovaries may be so poorly developed that menstruation is absent, irregular or scanty, in which case there may be no general phenomena.

Secondary Amenorrhea (Suppressio Mensium).—Secondary amenorrhea refers to the abnormal suppression of the menstrual flow, in cases in which menstruation has previously occurred. The suppression may be gradual or sudden.

Causes.—The usual causes include obesity occurring after marriage in the pituitary type of woman in which the ovary seems to participate in the general process or in hyperinvolution of the uterus, the result of prolonged lactation; chronic pelvic inflammation with resulting destruction of ovarian tissue or marked thickening of the ovarian tunic preventing ovulation. Or in bilateral cystic or solid tumors of the ovary of a malignant type or where the ovarian parenchyma is destroyed, or from chronic or wasting diseases; as anemia, chlorosis, tuberculosis, diabetes, nephritis, Graves' disease, malaria, etc., or the catamenia may be absent in acute diseases which temporarily check the appearance of the menses on account of the debility which accompanies them; as typhoid fever, pneumonia, diphtheria, the exanthemata and rheumatic fever. Amenorrhea may be one of the earliest symptoms of acromegaly or of Addison's disease.

Secondary amenorrhea is really salutary, as the system in many acute and chronic conditions cannot afford the amount of blood loss and nerve force demanded from it in order to keep up the menstrual function.

Symptoms.—*Amenorrhea is in reality itself only a symptom of some pelvic or constitutional disease;* it is, however, *the absence of the normal menstrual flow* which causes the patient to seek advice. While menstruation may cease suddenly in women who otherwise show no derangement of health, others complain of headache, sacral and pelvic pains, radiating down the thighs, flashes, and other nervous phenomena which appear at each period, in place of the menstrual flow. The usual nervous, toxic and circulatory disturbances of the menstrual epoch constitute the menstrual molimena. Digestive and nutritional disorders are not uncommon.

Diagnosis.—*The diagnosis of amenorrhea is the recognition of the cause. The cause should be determined in every case;* uterogestation, ectopic pregnancy, lactation, the menopause, and general anomalies must be positively excluded *before arriving at a diagnosis.*

In young girls who have arrived at the age of puberty without menstruating or who have had the recurring subjective symptoms of menstruation without the appearance of the menstrual flow—a careful pelvic examination should be made under anesthesia.

Treatment.—The treatment of amenorrhea must have direct reference to the cause. In those women presenting evidence of poor nutrition, the general health should be improved by supportive and hygienic measures. A definite hygienic regime is imperative, in which special attention must be given to the hours of rest, habits of work, study, exercise, recreation, and to the regulation of the diet, the care of the bowels, and other excretory organs. Fresh air, sunshine, physical and mental rest, and forced feeding do much toward restoring the debilitated. Strychnine, grain $\frac{1}{40}$, or chloride of gold and sodium, grain $\frac{1}{10}$, t. i. d.; and calcium preparations add tone to the exhausted nervous system.

In anemia, a Blaud pill alone or combined with dilute hydrochloric acid, given with the meals, tends to improve the blood picture. Binoxide of manganese, grains ij, every two or four hours or the arsenical preparations are good hematinics.

In rheumatic or gouty subjects guaiacum, cimicifuga, the salicylates, aspirin, etc., have a beneficial effect.

The amenorrhea of obesity, where other evidence of hypothyroidism is present, should be treated by exercise, regulation of diet and bowels, and the administration of ovarian and thyroid extracts the latter is given in gradually increasing doses.

Pelvic and general massage may be employed with advantage in many cases of amenorrhea. Pelvic massage is especially valuable in an undeveloped condition of the uterus.

Electricity in the form of the static or faradic currents has a favorable general effect on the body nutrition. The static current has recently been used by Snow and Hirst with satisfactory results.

Locally the faradic and galvanic currents may be used to improve the pelvic circulation. The positive pole should be placed over the sacrum or over the pubis, the negative electrode within the uterus. The introduction of an *electrode into the uterine cavity is not free from the danger of infection*, and should only be used *with the strictest asepsis.*

Emmenagogues are remedies which excite the functional activity of the pelvic organs, hence they have little place in the treatment of amenorrhea resulting from an exhausted state of the general system or the primary amenorrhea of congenital anomalies. One of the direct emmenagogues is ovarian extract, grains v, t. i. d.; apiol,

♏ v, t. i. d. causes a direct congestion of the pelvic organs. It may be used in exceptional cases to reëstablish the menses in suppression due to cold, emotion, etc., and is usually given for a few days before the expected menstrual date. In acute suppression hot fomentations over the lower abdomen, hot hip baths, hot foot baths, and warm vaginal douches have a kindly influence on the pelvic circulation and are safer for general use than the administration of emmenagogue drugs.

Oxalic acid in $\frac{1}{4}$ to $\frac{1}{2}$ doses and aloes $\frac{1}{10}$ to $\frac{1}{8}$ grain are sometimes effective in bringing on the menstrual flux. *As a general rule direct emmenagogues are seldom advisable.*

Uterine Hemorrhage.—*Menorrhagia is excessive menstruation.* The blood loss may be excessive in amount or in duration and be so great as to impair the general health, producing secondary anemia, etc. In some women the menstrual flow is naturally profuse without impairment of their general health, this is probably due to hyperfunction of the ovaries and is not properly menorrhagia. *Metrorrhagia is a uterine bleeding occurring in the intermenstrual period.*

Causes of Menorrhagia and Metrorrhagia.—The causes of excessive uterine hemorrhage at the menstrual period or in the intermenstrual interval are local and general conditions which produce congestion of the uterus and its appendages, as retrodisplacements, subinvolution, interstitial or submucous fibroids, malignant disease, sclerosis of the uterine bloodvessels, incomplete abortion, ectopic gestation, placenta previa, endometritis, acute and chronic para- and perimetritis, oöphoritis and perioöphoritis or ovarian cyst with a twist in the pedicle, or renal, cardiac or pulmonary disease; hepatic cirrhosis, syphilis, chronic malarial poisoning, purpura and anemia.

As has already been stated in the chapter on Gynecological Diagnosis, genital hemorrhages may be grouped in three classes:

1. Those in which the menstrual period is prolonged or excessive, or in which the intermenstrual interval is shortened. Menorrhagia of this type is produced by local conditions which cause a circulatory stasis in the pelvic circulation due to impairment of the contractile power of the uterus as is found in uterine displacements, subinvolution, intramural tumors, chronic adnexal inflammations, etc.

Furthermore menorrhagia may be associated with certain acute infectious diseases as typhoid fever, smallpox, scarlet fever, acute articular rheumatism and influenza which may be explained by the effect of the infection on the cardiac force or be due to the participation of the uterine mucosa in the exanthematous involvement.

2. Those cases of intermenstrual bleeding *not preceded by a period of amenorrhea* consequently not suggestive of some condition of the pregnant state in which the bleeding is irregular or continuous, such as may occur in uterine polyp, malignant degeneration, mucous polyp, chronic metritis, fibrosis uteri, arteriosclerosis, and constitutional disease associated with hypertension.

3. Uterine hemorrhages which have been preceded by a definite period of amenorrhea of the pregnant state, in which may be classed the metrorrhagia of threatened or incomplete abortion, ectopic gestation, subinvolution, placenta previa, etc.

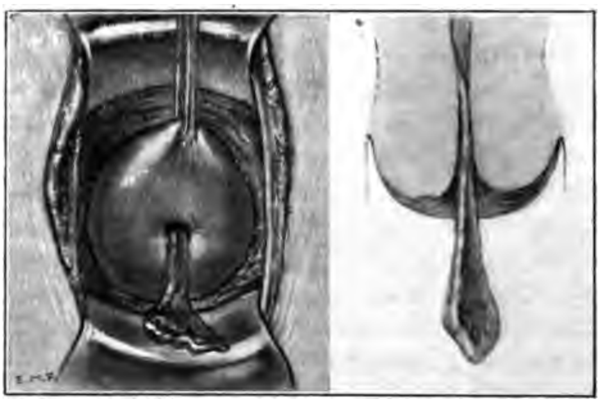


FIG. 92.—Mucous polyp from the cervical canal producing metrorrhagia in a nulliparous woman past the menopause.

Prognosis.—The prognosis in uterine hemorrhage depends not only upon the cause, which may of itself tend toward a fatal issue, as in malignant disease, but also upon the amount and the persistence of the bleeding, for the constant loss of blood always results in a secondary anemia, often so pronounced as to impair the patient's resistance to intercurrent disease.

Treatment.—The treatment of menorrhagia and metrorrhagia may be considered under the following headings, *i. e.*, (1) the immediate control of uterine hemorrhage; (2) the management or correction of the cause which produces the bleeding.

Direct Hemostatic Measures.—Direct hemostatic measures should be employed for the immediate control of the bleeding; these include (1) physical rest; (2) topical applications; (3) electricity, galvanism, the roentgen rays and radium; (4) the administration of drugs and serum and (5) hygienic measures Rest in bed in the recumbent position at the menstrual period with or without the foot of the bed elevated does much toward limiting the amount of blood lost, while the administration of small doses of opium or one of its derivatives, preferably morphine, contributes to the *mental quiet.* A thorough pelvic examination is imperative before any form of medication is employed.

Sexual abstinence must be enforced, as coitus is apt to disturb existing local conditions.

Topical applications consist of an ice bag applied to the hypogastrium or *hot vaginal douches* at a temperature of 120° F.; for fifteen minutes, used two or three times daily, or *cool douches* at a temperature of 60° to 65° F.; given for five minutes; or the employment *of the vaginal or an intrauterine tamponade* of gauze in severe hemorrhage; *atmocausis,* or the direct application of steam to the interior of the uterus, is a process which effectively controls uterine bleeding (myopathic metrorrhagia) but it is difficult to limit the extent of the steam's penetration; severe shock and peritoneal inflammation have followed its use. *Applications* of zinc chloride, in strength of from 10 to 50 per cent; may be made *to the interior of the uterus* or the bleeding surface of the cervix.

In bleeding from hypertrophic conditions of the endometrium *curettage* is indicated. All curettings should be examined microscopically, that malignancy may be eliminated.

The *galvanic current* has been used to check hemorrhage from the uterus due to subinvolution and fibroids. The positive pole is introduced within the uterine canal, the negative over the sacrum. The writer feels that the electrode placed within the uterus may be a source of great danger, even in the hands of an expert, hence does not recommend its use.

The roentgen rays will control those obstinate cases of menorrhagia or metrorrhagia due to chronic metritis and myomata unless the myomata are infected, polypoid, or degenerating, or suspected of malignancy. The older the patient the better the response.

The method presents some risks to the young woman in the child-bearing period, as the possibility of producing sterility by the effect of the roentgen rays on the ovarian tissue is well known. The rays should be properly filtered to avoid producing a roentgen-ray dermatitis of the overlying skin.

Radium and mesothorium have the power of controlling hemorrhage from submucous myomata, fibrosis uteri and malignant growths of the uterine cavity and cervix when employed in sufficient dosage (*i. e.*, 50 to 150 milligrams) to destroy the growth and substitute for it connective tissue. In properly selected cases radium will positively check uterine bleeding, it destroys the endometrium and the bloodvessels in subjacent basal membrane.

Drugs.—The hemostatics used for the control of uterine hemorrhage are: atrophin, grain $\frac{1}{100}$, given at bedtime; the fluid extract of hydrastis canadensis in 10-minim doses t. i. d.; or hydrastin hydrochloride, grain $\frac{1}{2}$ t. i. d.; fluidextract of ergot and tincture of cinnamon, equal parts, ♏ xl t. i. d.; stypticin, grains ij to iij t. i. d.; by mouth, or injected hypodermically into the gluteal muscle, or styptol grains ij to iij t. i. d.; adrenal chloride solution, 1 to 1000, injected hypodermically, or in strength of 1 to 2000 applied to the uterine endometrium on narrow packing gauze. Pituitary extract in the form of pituitrin, or pituitary liquid 1 or 2 ampoules (B. W. & Co.) injected over the uterus, causes prompt muscular contraction in uterine relaxation.

Thyroid extract, grains iij to gr. v. t. i. d., lessens uterine hyperemia, but is a cardiac depressent. It is especially valuable in menorrhagia due to high blood pressure.

Hamamelis.—The fluidextract of witch-hazel seems to work wonders in the hemorrhage of passive uterine congestion, or the bleeding of the puerperia. A decinormal solution of sodium hydrate injected into the blood stream increases the coagulability and favors the arrest of hemorrhage. All cases of metrorrhagia occurring at or near the menopause should be subjected to a diagnostic curettage and have the curettings examined microscopically.

Hygienic measures, such as fresh air, good food, general tonics, massage, exercise and bathing improve the patient's general tone by increasing the hemoglobin and number of red corpuscles.

In the myopathic bleedings in young girls, the injection of blood serum (either human or horse serum) or calcium chloride in a 10 per cent solution by intravenous injection, increases the coagulability and checks the hemorrhage.

Direct transfusion is sometimes necessary. The management and correction of the cause which produces the bleeding includes such surgical measures as curettment, salpingectomy, oöphorectomy, myomectomy and hysterectomy.

Vicarious Menstruation.—Vicarious menstruation is a bloody discharge from some other part of the body than the uterus, wholly replacing the uterine discharge at the menstrual epoch. The ectopic bleeding may take place from the nose, the larynx, the stomach, the intestines, the rectum, or from other mucous membranes. It is extremely rare and usually found in neurasthenics.

Dysmenorrhea.—Dysmenorrhea is difficult or painful menstruation. Most women experience what is called the "menstrual molimena" which is manifested by some degree of pelvic discomfort, nervous excitation and lassitude at the menstrual period; but these symptoms are not so severe as to incapacitate them for their daily work. Painful menstruation is abnormal, and while dysmenorrhea is in reality a symptom, it deserves detailed consideration because of its frequent occurrence, the wide range of reflex symptoms excited and its dependence upon definite pelvic pathology.

Severe menstrual pain referred to the uterus or ovaries seldom occurs except there is a pathological lesion. It is, however, possible for a woman with an excitable and unstable nervous system to exaggerate the normal menstrual pains into actual suffering; therefore, in considering the cause of dysmenorrhea, it is always necessary to take into consideration the state of the nervous system and the endocrinal development. Dysmenorrhea may be (1) primary; or (2) secondary.

It is primary when the pain has no relation to pathological lesions in the genital tract. In this form of painful menstruation, the subjective symptoms are simply an exaggeration of the normal menstrual discomforts, and is often present in depraved states of the blood or nervous system; as malaria, syphilis, chlorosis, gout, rheumatism, hysteria, inherited neurosis or neurasthenia. Furthermore, the habits of life often have a distinct influence upon the degree of suffering, menstrual discomfort, and pain may result from high living, sedentary life with intestinal stasis, masturbation, or excessive sexual indulgence.

Furthermore, it has been shown that lesions remote from the genital organs may cause dysmenorrhea; such as diseases of the nasal turbinates or eyestrain. Recently Fleiss, Mayer, and Brettauer have called attention to tumefaction and engorgement of the "genital spots" in the nasal mucosa, which at menstruation swell and become slightly cyanotic.

Destruction of the mucosa at these points has cured a certain number of women suffering pain at the menstrual period.

Secondary dysmenorrhea is the direct result of some pathological lesion in the vagina, cervix, uterus, tubes, ovaries, parametrium or continuous pelvic peritoneum.

Causes.—The principal causes are:

1. Maldevelopments and malformations of the genital organs, a hypoplasia of the uterus or adnexa, which is but a local manifestation of the woman's faulty development may cause intense suffering at the period.

2. Malpositions of the uterus and adnexa. These disturb the equilibrium of the pelvic circulation, produce a tissue hypertrophy which in turn results in dysfunction of the ovary, endometrium or myometrium.

3. Pelvic inflammatory diseases. This interferes with the functional activity of the ovary, and the interrelation between this and the uterus so disturbs the physiological processes of the normal menstrual cycle.

4. Uterine or pelvic tumors enlarge or distort the uterine cavity and thus disarrange the circulatory relations common in submucous and interstitial fibroids.

5. Exfoliative endometritis, the so-called membranous dysmenorrhea; where an endometrial cast of the uterus is passed with the menstrual flux attended by labor-like pains.

Symptoms.—Pain with menstruation is the characteristic symptom of dysmenorrhea. The pain may be located in the hypogastrium, in the inguinal region, behind the symphysis, or in the back and radiate down the thighs. It may become constant or intermittent; beginning before the period or occurring only with the appearance of the menstrual flux. The character of the pain generally varies with the tissues involved; cramp-like in flexions, because (1) of the kink in the uterine canal, or (2) the stenosis of the internal os due to spasm or the premenstrual swelling of the mucosa, bearing down or dragging-in uterine enlargements such as subinvolution, metritis or retrodisplacements, uterine pain dull and aching in character in interstitial myomata, shooting or knife-like in cystic changes in the ovary, or general pelvic and abdominal soreness in chronic peritoneal inflammation.

The relation which the occurrence of the pain has to the appearance of the flow also helps to suggest the origin of the dysmenorrhea. Premenstrual pelvic discomfort and abdominal soreness is a constant symptom of chronic peritoneal conditions, or in lesions involving either the parametrium or tubes. The appearance of the menstrual flow usually relieves this bruised feeling which is again complained of after the period. Kidney-pain and sensitiveness is not an unusual accompaniment of parametrial inflammations, owing to the compression of the ureter by the swollen parametrial tissues. Labor-like pains occurring on the first day, associated with lumbosacral backache, suggest that the lesion is a flexion complicated with a uterosacral cellulitis.

Reflex gastro-intestinal symptoms (nausea and vomiting) are frequently associated with severe dysmenorrhea. It must be admitted that repeated monthly pain leaves a marked impression on the general health and nervous system.

Diagnosis.—Each patient suffering from painful menstruation should be individually studied; the time of occurrence, the location, the character and radiation of the pain all have suggestive significance. The cause should be sought, and as a rule, a careful pelvic examination under anesthesia should be made to determine the site and extent of the pelvic lesions.

Malformed or undeveloped genital organs cause dysmenorrhea. Painful menstruation of this type dates from the very onset of the menstrual function and is produced (1) by the ineffectual menstrual molimena provoking uterine colic, or (2) by atresias of the genital tract producing obstructions or retention of the menstrual flow. In considering dysmenorrhea in the presence of maldevelopment, one must never lose sight of the part played by the ductless glands in the development of the perfect or imperfect pelvic viscera. In malpositions of the uterus and ovaries, *the pain is not primarily due to the displacement*; but rather to the complicating lesions within the uterus and its appendages consequent upon chronic pelvic congestion or circulatory stasis produced by the malposition, or the inflammation which may result from acute suppression of the menses from exposure to cold, intestinal disorders, displacements, subinvolution, pelvic varicocele, and tumors of the broad ligaments, and from infections of the cervix, endometrium, myometrium, parametrium, tubes and ovaries.

In membranous dysmenorrhea (exfoliative endometritis) the superficial layer of the endometrium is cast off as a triangular sac (cast) or piecemeal as shreds of a more or less firm consistence. This is believed to be caused by an interstitial endometritis that interferes with the separation and expulsion of the endometrium in fragments or a diminution in the tryptic ferment of the uterine mucosa. There is an excess of round tissue cells and fibrillated tissue in the membrane cast off. The membrane is unlike the decidual cast of an ectopic gestation, in that it presents no chorionic villi. Tumors situated in the pelvis always disturb the menstrual function to a greater or less degree owing to the venous stasis produced.

Intermenstrual Pain.—Some women complain of periodic attacks of pain which occur in the intermenstrual period; this is said to be due to aberrant ovulation occurring in chronically diseased ovaries. The pain usually starts at a time midway between the menstrual periods, or on or about the fourteenth day after the onset of the last menstruation (Heaney) the pain is distinctly periodic and occurs every month with as much regularity as the menstruation. When once established it rarely fails to appear unless amenorrhea occurs, when as a rule it ceases. The pain usually begins on one side of the abdomen or groin and radiates to the thigh; left sided pain is most common, it is cramp-like, spasmodic and intermittent with periods of complete relief. The duration may be only two or three days, or it may continue until the next menstrual period. The time of greatest relief is just after menstruation.

In all of the cases studied by Rosner and Heaney, the ovaries were either sclerotic or had undergone cystic degeneration. In several of the writers' cases there was a history of a puerperal infection, and on section the ovary was found buried in adhesions; many of the cases in which the right ovary is involved present a history of acute appendicitis with operation and drainage.

Treatment.—The treatment, when possible, must be addressed to the cause, *and there is always a cause for dysmenorrhea*, however, elusive it may be. Pelvic lesions may be recognized by examination under anesthesia. Diatheses, and the general health and habits of each individual must be thoroughly investigated before any treatment is instituted.

In young girls where no gross pelvic lesion is demonstrable much benefit may be derived from establishing a general hygienic regimen; including a prescribed amount of rest, recreation, open-air exercise, regulation of the bowels and proper nutrition. Abstinence from meat for a few days before and during the period, the administration of ovarian extract, an enema just before the flow appears, and rest in bed on the first day will often result in a painless period. Hot sitz baths frequently relieve the pain when due to pelvic congestion; as do some of the hot mud baths of some of the foreign "Bads." Sea bathing is also curative in certain cases.

In gouty or rheumatic patients, aspirin or salophen in grain-x doses given with a goblet of water four or five times a day, for several days before the expected flow, often relieves the pain.

In chronic pelvic lesions the management is (1) palliative or (2) operative.

In the intermenstrual interval much may be done to reduce the general pelvic congestion, with hot douches and topical applications, as tampons saturated with ichthyol and glycerin 25 per cent, or boroglyceride applied to the vaginal vault or counter-irritation to the fornices with iodine and phenol or over the lower abdomen in the form of hot poultices, dry cups, and sinapisms and cupping over the lumbosacral region. *The sigmoid and rectum must be kept empty*, for a loaded pelvic colon engorges the pelvic viscera. Free use of sodium bromide during the intermenstrual period; while phenacetin, apiol, antipyrin, codeine, etc., for the pain during the period contributes much toward the patient's comfort.

2. Definite lesions of the uterus, tubes or ovaries require surgical attention. Moderate dilatation of the cervix, using the Hegar graduated sounds for a few days before the flow begins, may diminish

the uterine pain of the first day *when due to an uncomplicated flexion. This procedure, however, is not free from the danger of infection,* and should, in the writer's opinion, be discarded for more surgical methods, under anesthesia, done under the strictest asepsis, as dilatation of the cervix, discission of the cervix, straightening out of the uterus by the Reynolds' operation, or the introduction of the glass or hard-rubber stem. It should be a cardinal rule that *a stem should never be inserted in the presence of any cervical inflammation.*

In membranous dysmenorrhea (exfoliative endometritis) the endometrium may be removed by curettage with a sharp curette, and after carefully drying the interior of the uterus with sterile gauze, the cavity should be packed for four or five minutes with gauze moistened with pure carbolic acid, neutralizing it a few seconds later with alcohol to prevent the caustic effect of the phenol on the vagina; the vagina should be swabbed with alcohol while the carbolic gauze is in the uterus. The effect of this treatment may relieve the condition for a number of months. Membranous dysmenorrhea is frequently intractable.

In anemic patients no local treatment should be instituted until the blood state has been improved; this may be done by blood transfusion, tonics, sunshine, exercise, a generous diet, general massage, and the employment of the *static spark* to the sacral region in ten-minute seances, every other day for a few days before the period; or faradism, one electrode applied over the sacrum, the other over the hypogastrium.

Childbearing usually effects a cure when the pain is due to a cervical stenosis or an undeveloped uterus.

Palliative measures to relieve the menstrual pain include such drugs as tincture of pulsatilla, of wine colchicum ♏x-xv t. i. d., for several days before and during the period, and antispasmodics, as the extract of cannabis indica grain $\frac{1}{6}$; benzyl benzoate in a 20 per cent emulsion in ʒsj doses of viburnum prunifolii grains iv; tincture of gelsemium ♏x; antipyrin grains v, phenacetin grains v, and the nitrites; amyl nitrite and nitroglycerin, especially in vasomotor spasm.

In neurotic cases, hyoscin hydrobrom in doses of grain $\frac{1}{100}$, or elixir ammonii valerianat N. F. ʒj–iij twice daily or sodium bromide grain xx-xl t. i. d., seems to control the severity of the paroxysms of menstrual pain. Some of these cases yield most kindly to the administration of ovarian extract. Moderation in all sexual relations should be encouraged.

HYPERPLASIA AND HYPERTROPHY OF ENDOMETRIUM.

Glandular hyperplasia and hypertrophy of the endometrium may be associated with definite inflammatory lesions in the uterus or may be due to a passive uterine hyperemia from other causes, *i. e.*, malpositions of the uterus, cervical disease, uterine neoplasms, ovarian disease, chronic constipation or the circulatory obstruction arising from cardiac, pulmonary or hepatic disease. This hypertrophy is but an exaggeration of the normal changes, an increase in the dilatation and tortuousness of the glands, which take place in the endometrium in the regular menstrual cycle. While hyperplasia is an increase in the number, often associated with excessive proliferation of the lining cells. The anatomical changes which take place in the uterine structures as the result of chronic hyperemia are:

1. Increased vascularity.
2. Overgrowth of the endometrium, including the structures and the interstitial tissues between the glands. The endometrium is thickened and the glands are increased in number and size.
3. The formation of polypoid excrescences.
4. General enlargement of the uterus from edema and hyperplastic changes in the myometrium.

Other causes of a thickened endometrium of non-infective origin are: Ectopic pregnancy, remnants of chorionic villi after abortion, subinvolution, cardiac disease, over-stimulation from ovaries, sclerosis of the bloodvessels, and fibrotic changes in the uterine muscle due to diseased ovaries.

Symptoms.—The symptoms of hyperplastic or hypertrophic changes in the uterine endometrium and adjacent uterine tissues are:

Menorrhagia.—Each period is more excessive or lasts longer than normal, owing to the circulatory stasis and the increased size of the uterus.

Metrorrhagia.—Irregular intermenstrual bleeding is not uncommon when the hypertrophy results in polypoid changes in the endometrium. These changes may be associated with retrodeviation of the uterus.

Leucorrhea.—A hypersecretion of mucus from the utricular and Nabothian glands results from chronic venous stasis in the entire organ. On physical examination the uterus is found to be *generally enlarged.*

Diagnosis.—The pathological diagnosis is made upon the microscopical examination of the curettings. In order to correctly interpret the appearances presented under the microscope it is necessary to take account of the time in relation to menstruation at which the mucosa was obtained, otherwise we may class as pathological a condition of the endometrium which may well be within physiological limits.

Treatment —The treatment consists of:

1. The correction of the cause and improving the pelvic circulation.
2. The removal of the thickened endometrium by thorough curettage of the uterine cavity.
3. Hysterectomy or the employment of radium when extensive hyperplastic changes have taken place in the muscular coats with resulting metritic enlargement.

SUBINVOLUTION OF THE UTERUS.

Subinvolution is the result of a partial failure of the retrograde process, which normally follows labor or abortion; a process by which, through absorption, fatty degeneration, and actual atrophy of the muscular and connective-tissue elements, the uterus returns to its natural size. In subinvolution owing to the retardation or premature cessation of the normal process of involution, the uterus remains enlarged, softened and congested, the vaginal walls and the uterine ligaments also fail of normal involution.

Pathology.—During pregnancy there is a great increase of all the constituent elements of the uterus.

The muscle fibers become enormously enlarged, the fibrous and elastic tissue is increased in amount, and the bloodvessels enlarge sufficiently to supply the increasing growth of the organ, insignificant vessels become large blood sinuses.

After labor the uterus undergoes rapid tissue changes, fatty degeneration occurs in the muscle fibers, greatly reducing their size, while many are completely destroyed—the greatest retrograde changes however, occur in the vessel walls, in Nature's effort to reduce their lumina to normal capacity.

Many of the vessels in the submucous layer become blocked with thrombi, while in the deeper layers a ring of thrombus is formed around the inner surface of the vessel which leaves the lumen still patent, though smaller. Coincident with this thrombosis the fibrous tissue in the media of the vessels becomes markedly swollen and hyaline and the elastic interna becomes enormously thickened and undergoes "vitreous degeneration."

The elastic fibers in the media undergo a similar change, that is they become swollen and change their staining properties. The adventitia undergoes a hyaline change similar to that in the fibrous tissue of the media. The next step is for the hyaline tissue of the media to flow through the degenerated elastica interna and where thrombus is present to convert it completely into hyaline tissue—when no thrombus is present the hyaline material flows around the sides of the vessel adjacent to the elastica interna forming the lumen of the new and smaller vessel.

In the vessels filled with thrombus, the lumen becomes completely occluded with hyaline material and the vessel is obliterated.

In the vessels which only contain a layer of thrombus or where the hyaline material has flowed in without a previous clotting, a lumen is preserved and lined with a layer of cells with large nuclei forming the endothelial lining of the new vessel. The hyaline material becomes invaded with muscle and fibrous cells which gradually convert the hyaline material into the muscular and fibrous rings of the new vessel, at this stage the new vessel is surrounded by the old vessel wall. Between the new and the old vessel walls is the "interarterial space" of Goodall filled with hyaline material.

Some of the large submucous vessels have two or more new vessels formed within the old one. In the vessels of the deeper parts of the uterus, there is only a slight diminution in the lumen. A new intima and only a part of a new media is formed while the adventitia is taken from the old vessel wall when the new bloodvessels are formed. The next step in involution is the fatty degeneration and absorption of the old vessel walls, which if the involution is complete entirely destroys the muscle fibers of the old media as well as the degenerated elastic and fibrous tissue of the old media and adventitia which in turn is absorbed. In the veins there is no definite elastica interna but the walls contain fibrous and elastic tissue. During involution the fibrous tissue forms a large hyaline mass which greatly constricts the lumen, this mass eventually becomes invaded with muscle and varying amounts of elastic tissue. *If the involution is retarded the hyaline tissue is converted into elastic instead of into muscular tissue.*[1] Hence it will be seen these vessel changes and fatty degeneration of the muscular tissues are the two main factors in perfect involution. Any condition therefore such as frequent pregnancy—pelvic injuries resulting in displacement or retained portions of placenta or membrane or infection which may retard or stop involution, leaves an organ with the degeneration of muscular tissue arrested, an excess of swollen elastic tissue, and the new bloodvessels surrounded by thick slabs of elastic tissue or by the remains of the old media impregnated with elastic tissue. This accounts for the increased size of the subinvoluted uterus. The principal changes due to subinvolution may be summarized as follows:

The uterus is symmetrically enlarged and hard. On cut surface the vessels with their surrounding elastic tissue slabs are strikingly visible and stand out from the surface, this is particularly noticeable in the outer two-thirds. The endometrium is thickened but is often much diminished. Microscopically there is an increase in the amount of fibrous tissue found between the muscle fibers and a large accumulation of elastic tissue around the arteries and groups of arteries.

The entire uterus is symmetrically enlarged and heavy, the muscular walls are thick and soft, the cavity is lengthened, and the endometrium congested and swollen. The bloodvessels remain large and the adjacent pelvic organs are in a state of passive congestion.

Causes.—The causes of subinvolution are *always puerperal, i. e.:*

1. Infections following labor or abortion.

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[1] The reader is referred to Goodall's monograph on "Involution."

2. Lacerations of the cervix and pelvic floor.

3. Retrodisplacements.

4. Getting up too soon after labor and thus disturbing the normal circulatory equilibrium in the pelvis, etc.

Symptoms.—The woman who has but recently been confined usually complains of *lumbosacral pain and a bearing-down sensation in the pelvis*, and her general health is more or less impaired or the lumbosacral and uterine pain may only be intense at the time of the menstrual period.

Menorrhagia and metrorrhagia and leucorrhea are commonly present. On *physical examination* there is usually some relaxation of the pelvic floor and a laceration of the cervix. The *uterus is symmetrically enlarged*, more or less *insensitive to manipulation*, the walls are soft and thick with no tumefaction, and the uterine cavity is lengthened. On inspection the vaginal walls and cervix present a dusky hue, the cervix is enlarged and secretes a tenacious mucus.

Prognosis.—The prognosis depends upon the early recognition of the condition and its correction during the puerperium before permanent hyperplastic changes take place in the endometrium and myometrium, for the size of the uterus cannot be reduced after chronic changes have taken place. The subinvoluted uterus will always show permanent pathology, about the bloodvessels and in the distribution of elastic tissue between the muscle fibers.

Treatment.—The treatment should be directed:

1. To reducing the size of the uterus.

2. To the cure of coexisting endometric hypertrophy.

3. To the cure of causal lesions, as repair of lacerations and the correction of displacements.

1. The size of the uterus may be reduced by the use of hot vaginal douches twice daily, at a temperature of 120° F., after which the patient should assume the knee-chest posture or "walk on all fours" (her hands and feet) for five minutes; this reduces the pelvic congestion and changes the circulation by allowing the pelvic veins to empty themselves.

Tamponades of wool saturated with boroglyceride placed against the cervix while the patient is in the genupectoral position will do much toward reducing the uterine engorgement. Blood-letting, by making multiple punctures in the cervix with a sterile spear should precede the hydroscopic treatment. Stimulating drugs, as ergot, mammary gland extract, hydrastin, strychnine, quinine, etc., contribute to the speedy involution of the uterus. General hygienic treatment, including fresh air, sunshine, regulation of diet, bowels, kidneys is also important.

2 and 3. The surgical methods employed, should local measures fail to reduce the size of the uterus, are curettage, trachelorrhaphy, or in case of extensive lacerations, amputation of the cervix and restoration of the pelvic-floor support. Malpositions, if recognized early, are usually corrected without difficulty, by the employment of a suitable pessary. This may be worn for several months or until the general tone of the pelvic supports has been restored.

HYPERINVOLUTION OF THE UTERUS.

Hyperinvolution of the uterus, "the uterus of lactation," or puerperal atrophy, is a condition in which the physiological process of uterine involution, following labor or abortion, progresses beyond the normal limits, and atrophic changes are found in the uterus and ovaries. The body and cervix are smaller than they were in the nulliparous uterus of the same woman. The body is small, round, hard and insensitive; the cervix is atrophied, soft, cyanotic and the seat of a profuse mucoid discharge, which is often very irritating.

Puerperal atrophy of the uterus is comparatively rare; it is supposed to be caused by prolonged septic infection, protracted lactation, or diseases of an exhausting nature, coincident with or following the puerperium.

Symptoms.—These patients suffer from:

1. *Prolonged amenorrhea,* due to the atrophic changes in the uterus and ovaries.

2. *Profuse leucorrheal discharge,* mucoid or mucopurulent in character.

3. Lumbosacral backache, vertical headaches, digestive disturbances, and general neurasthenic symptoms.

Diagnosis.—The diagnosis is made on the history of a recent labor or abortion, followed by prolonged amenorrhea and the physical signs of uterine atrophy, *i. e.*, the small cervix, the decreased length of the uterus, and the cyanotic appearance of the vagina and cervix.

Prognosis.—The atrophy of lactation is usually temporary and may be followed by enlargement of the organ after the woman regains her health. In a small number of cases, when the atrophy is marked the condition may become permanent and *menstruation cease for all time.*

Treatment.—The treatment is general and local. Among the general measures to stimulate the growth of the uterus and re-establish the pelvic circulation are diet, water, regulation of the bowels with laxatives, as aloes and podophyllum, a proper amount of rest and sleep, sexual intercourse, electricity and hydrotherapy, and such drugs as manganese dioxide, thyroid extract, ovarian extract, apiol, etc.

Locally puncture of the cervix, suction hyperemia, warm vaginal douches, and pelvic massage increase the blood-supply of the uterus.

CHAPTER IX.

INFECTIONS OF THE UTERUS.

ACUTE infection of the uterus (acute endometritis) is an inflammation of the mucous membrane lining the cervix and body of the uterus due to invasion of this tissue by bacteria. The origin of acute endometritis is either (1) puerperal or (2) non-puerperal. If the infection is of puerperal origin it is usually the result of inoculation of the puerperal wound (the interior of the uterus following labor or abortion) by pathogenic bacteria. The usual causative bacteria are the streptococcus or staphylococcus, singly or in combination, though not infrequently the gonococcus, which is often latent in the cervix, may join in and activate the other organisms.

Like any other infection, puerperal endometritis may be simply a wound inoculation—inoculation with bacteria of any area in the uterus where the normal reparative and healing process is taking place with an associated toxinemia, or it may become a spreading infection, spreading beyond the confines of the uterus by the lymphatics, or the bloodvessels, and show its clinical manifestations in systemic poisoning.

A puerperal infection of the uterus may produce in succession an endometritis, a parametritis, a peritonitis or a bacteriemia, when the process spreads through the lymphatics. On the other hand, when the infection spreads beyond the confines of the uterus through the bloodvessels, it may result in a thrombophlebitis or pyemia with local focci, or a bacteriemia.

Non-puerperal Infections.—Non-puerperal infections are either (1) gonorrheal or (2) septic in origin. While it is possible for other infecting organisms to invade the genital organs, such as the tubercle bacillus, the colon bacillus, the pneumococcus, the Bacillus diphtheriæ, the Bacillus aërogenes capsulatus, and saprophitic bacteria, the gonococcus and the streptococcus are the chief offenders.

The necessities for the development of an infection in any organ are (*a*) an avenue of entrance, (*b*) an infecting organism and (*c*) a receptive soil. All of these are found in the uterus following careless intrauterine instrumentation; as dilatation, curettage, or intrauterine medication.

Two general principles are recognized clinically in determining the origin of any uterine infection and its sequellæ. The first is a knowledge of the habits and the routes peculiar to the individual bacterium; and the second is a recognition of the tissues commonly involved; for instance the gonococcus is a surface germ, living and developing on the mucous membrane, or in the mucous membrane burying itself in the glands, and remaining in them latent, for long periods; while the streptococcus travels primarily through the lymphatics, and excites a more or less definite reaction in the perilymphatic tissues. This bug also may enter directly into the blood stream, and occasion a cellular reaction in the blood tissues; the degree of this reaction is dependent on the virulence of the coccus, and the resistence of the individual blood cells.

Acute Septic Endometritis.—Pathology.—Acute septic endometritis is seldom seen except in the puerperal woman or following intrauterine instrumentation; so it may be primarily considered as a wound infection.

If infection of the uterine wound takes place after labor or abortion by the migration and inoculation of the infecting cocci from below, or by their introduction by hand or instrument from without, the normal process of wound healing is disturbed and the mucous membrane becomes swollen, rough and covered with the thickened decidua in a state of superficial necrosis. The surface is moist and is covered with a mucopurulent or a mucosanguineous smeary material. The cervix is almost always coincidently involved and is swollen and eroded; and if lacerated the wounds are covered with a diphtheroid membrane. Uterine involution is arrested because of the reaction which is excited in the subjacent tissues and a circulatory stasis is induced. The uterus becomes edematous and relaxed, and this gives the bacteria ready access to the lymphatics and the blood stream through the venous radicals; for the lymphatic distribution in the uterine wall is very minute, and the terminal sinuses of the uterus empty into the arcuate veins, and they in turn empty into the uterine veins. *It is the retraction and contraction of the uterus which presents a barrier to this bacterial invasion;* and conversely it is relaxation of the uterus which allows the bacteria free access to the blood stream.

Bumm describes two distinct forms of endometritis; first, that which is due to putrid or bacillary infection, in which the bacteria are limited to the surface and to the necrotic material lying thereon; by the protecting bank of leukocytes, and small round cellular reaction in the basal membrane; and the second, a coccal or septic form where the streptococcic or other pyococci invade the lymphatics or bloodvessels by passing through the protective walls.

Unfortunately, this clean cut pathological distinction is not found clinically, for it is seldom that the bacteria are wholly confined to the decidual surface; for there are many areas in which the protective zone of small round cell deposit, is not so well defined as to prevent bacterial migration into the underlying tissues, therefore, it must be admitted clinically, that some degree of metritis is a constant accompaniment of acute endometritis.

In the putrid form the surface endometrium is covered with thick, fetid material often containing gas bubbles. The decidual surface is of a grayish, or yellowish or greenish color, or may even be black because of the decomposed blood. It is impossible to wipe the surface smooth as in the normal uterus, owing to the varying depth of the superficial necrosis. If the bacteria are virulent there may be actual sloughing of the endometrium, so that instead of having a smooth granulating surface, we find patches of localized ulceration, and the whole interior of the uterus may become putrescent. This is the case when the putrefactive bacteria are acting jointly with pyococcic germs. If this superficial gangrene goes still further in the uterus, owing to the greater virulence of the bacteria; portions of the lining of the uterus, and even some of the underlying muscle itself may slough off, producing the metritis desiccans of Garrigues.

If the infection is due to the Streptococcus pyogenes and pyococci alone, unmixed with saprophytes, there is no fetor and the surface of the interior of the uterus is usually smooth and not deeply necrotic.

From what has been said, it will be seen that in the large majority of cases; *the bank of small round tissue cells and leukocytes, is sufficient* *to limit the infection to the interior of the uterus,* unless Nature's efforts are interfered with by the meddlesome surgeon who insists on removing the necrotic material within the uterus; notwithstanding that it has been shown to be the result of Nature's conservative starvation process. By this removal, Nature's barrier in the form of the *granulation zone* is broken through.

Coccal Endometritis.—In this form the infective bacteria, the streptococcus or other pyococci have a more marked invasive quality, and attack the living tissues, and are introduced or penetrate into the lymphoid lining, or the myometrium, causing a prompt reaction and producing a necrotic layer of endometrium, which resembles the false membrane of diphtheria. Whether these cocci advance further than the interior of the uterus, and invade the lymphatics and blood-vessels of the uterine wall, or remain confined within the uterine cavity depends on the completeness with which the granulation zone is developed, and the virulence and the penetrability of the invading bacteria. If the reaction is sufficient to excite prompt resistence, and the leukocytic barrier increases in thickness, the lochia acquires bactericidal properties which tend to sterilize the interior of the uterus, and the discharge becomes purulent in character similar to the discharge from any granulating wound.

Gonococci Endometritis.—Acute gonorrheal endometritis is a sequel of gonorrheal cervicitis, for the infection is primarily localized in the cervix (as an acute endocervicitis) and usually extends to the corporeal endometrium about the time of the menstrual period, or may follow miscarriage or labor, or local applications to the cervix. The lips of the cervix are swollen, congested, sensitive, and bleed when handled. Surrounding the external os is a soft bright red area, the edges of this area are not sharply defined and small spots may be seen over the adjacent portio. The swollen injected angry mucosa is everted and protrudes at the external os, and is bathed with a thick purulent tenacious secretion containing numberless gonococci. *Local interference,* as intracervical treatment, always tends to extend the infection upward. When the infection extends past the internal os there is more or less uniform reddening and thickening of the entire endometrium, which is bathed with a profuse serous or seropurulent secretion. The musculature is increased in thickness, and is succulent from serous infiltration and turgid from engorgement of the bloodvessels. The uterus is slightly enlarged and tender, the consistency is increased and the mobility limited.

Acute gonorrheal endometritis extends rapidly into the Fallopian tubes and thence to the pelvic peritoneum producing an acute inflammation of the pelvic organs.

Symptoms.—The attack usually begins during or directly after menstruation, an abortion or term labor, or after local applications to the cervical canal by infection from the cervix; for the reason that the internal orifice of the cervix is more patulous at these times and the blood makes a good culture medium for the growth and multiplication of gonococci.

There is usually a history of frequent and burning urination and the early manifestations of gonorrhea; it may be ushered in with a chill or chilly sensations. There is a moderate elevation of temperature, the fever seldom rising above 102° F., and an increased pulse rate. The patient may complain of pelvic tenesmus, vesical irritability with pain in the lower abdomen and back, and a profuse purulent or sanguino-purulent leucorrhea. The uterus is enlarged, swollen, and sensitive; its consistency is increased while its mobility is diminished.

The gonococcus may be demonstrated in the uterine discharge, or in the pus from the periurethral (Skene's) glands or in the ducts of the vulvovaginal glands. The rapid recession of the local and general signs of acute infection may be regarded as a characteristic of gonorrheal infection, or the infection may be so mild as to cause few or no appreciable symptoms. Some degree of metritis always coexists in acute endometrial infections.

Diagnosis.—The diagnosis is made upon the:

1. History.
2. The symptoms.
3. The physical signs.
4. And confirmed by the microscopical examination of the discharge from the uterus.

Prognosis.—Gonorrheal infection of the uterus is always serious because *of its tendency to extend to the tubes* and through them to the pelvic peritoneum, *leaving a permanent morbidity.* It is also dangerous to life, for it may cause a fatal peritonitis. While it is the rule for gonorrheal infection of the uterus to promptly extend to the tubes and produce an endosalpingitis, with its sequelæ, or the inflammatory reaction may be confined to the uterus. The extent of damage following an acute attack depends largely upon the promptness and efficiency of the local treatment.

Treatment.— *Nature tends to check the upward extension of gonococcic inflammation at the internal os and at the uterine orifices of the tubes*, hence, this localization should be favored by the prompt insistence upon:

1. *Rest in bed.*
2. *Postural drainage.*
3. *Local cleanliness* which are the basic principles in the management of acute gonorrheal infections of the uterus. *Active treatment during the acute stage only spreads the infection.*

The patient should be placed at rest in bed, in the Fowler (elevated trunk) posture to secure proper drainage; a saline cathartic may be given to unload the lower bowel and reduce the pelvic congestion, and an ice bag should be placed over the hypogastric region to diminish the local uterine and abdominal tenderness; opium or some of its derivatives may be necessary to control pain. The urethra and bladder can be efficiently cleansed by increasing the amount of the urinary output, which is done by the exhibition of plenty of pure water. The diet should be fluid and non-stimulating. Frequent cleansing of the vulva with mild antiseptic irrigations is necessary for the patient's comfort. *Vaginal douches should be withheld during the acute stage of the disease;* later douches of corrosive sublimate 1 to 5000, or permanganate of potash 1 per cent solution given twice a day, aid in destroying the cocci.

The patient must be kept quiet for a long period after all acute symptoms have disappeared, better until after the next succeeding menstrual period.

Septic Endometritis.—Septic endometritis is an acute infection of the endometrium due to its invasion by the ordinary pus-producing microörganisms following intrauterine instrumentation, abortion or term labors. *It is primarily a wound infection.*

Symptoms.—The symptoms are as follows:

Within twenty-four to forty-eight hours after labor, abortion, or intrauterine instrumentation, the acute symptoms manifest themselves by a chill or chilliness, which is followed by a sharp rise in temperature and pulse rate; the lochia are diminished or suppressed, depending upon the height of the fever, and the patient complains of intermittent or continuous uterine and lumbosacral pain, as the uterus is apt to be relaxed and allow blood-clots or retained lochial discharge to accumulate within the cavity; as a result there is local uterine pain and tenderness referred to the back and hypogastric regions. The patient usually complains of headache, and is more or less prostrated from the absorption of toxic products.

Physical examination elicits tension and tenderness over the lower abdomen. The uterus is large, tender and sensitive to motion, and there is a purulent or sanguino-purulent discharge escaping from the cervix. This discharge may be fetid and offensive in case the saprophytic bacteria are present in the uterine contents.

In pure streptococcic infections there is usually no odor or fetor to the lochial discharge. This form of infection is seldom confined entirely to the uterus, but usually precedes a cellulitis or pelvic peritonitis, so that clinically the picture is one of an inflammation of the pelvic viscera.

Treatment.—The treatment of acute septic endometritis should be one of "intelligent inactivity" which favors the development of the "granulation zone" and stimulates uterine contraction and drainage. These objects are obtained by:

1. Rest.
2. Postural drainage.
3. Local cleanliness.
4. Abstinence from any form of intrauterine treatment.
5. General supportive measures to increase the patient's resistance.

The lowest mortality and mobidity in the individual case is to be obtained by the employment of general supportive measures.

The Fowler position favors postural drainage. An ice bag over the hypogastrium relieves the pain and tenderness, while it stimulates the uterus to contraction. Firm uterine contraction is Nature's greatest barrier against bacterial invasion; hence we advocate the free use of ergotol and pituitary extract hypodermatically for the first forty-eight hours after delivery, the ingestion of large quantities of pure water, saline solution by the rectum, or by injection under the skin, increases the kidney secretions and aids in washing out the toxins. Tepid sponging and an ice bag over the precordium will relieve the fever. Strychnine in $\frac{1}{30}$- to $\frac{1}{20}$-grain doses. Alcohol, forced feeding, and fresh air act as systemic supports.

In puerperal endometritis the uterine content is left undisturbed to be separated and expelled by uterine contraction unless there is active hemorrhage; in which case it is advisable to place a firm gauze vaginal pack against the cervix which will not only control the bleeding but stimulate uterine contraction. In our experience the infection remains confined within the uterus unless the natural barriers (the granulation zone) are penetrated by curette or finger, when the infection spreads from the uterus along the mucous membrane to the tubes or to the adjacent tissues by the lymphatics and the bloodvessels. The gonococcus always follows the former route; while the streptococcus, staphylococcus, and other bacteria reach the parametrium, peritoneum and blood stream through the last-named channels. All acute inflammations of the endometrium produce associated interstitial changes in the uterine wall, owing to the lymphoid character of the structure lining of the uterus.

Chronic Endometritis.—Chronic endometritis may be of the (1) infective or (2) non-infective type. Gonorrheal and tubercular endometritis are examples of the infective type, in which permanent interstitial changes may be found in both endometrium and myometrium. The non-infective type of endometrial hypertrophy is dependent upon circulatory changes which result from local lesions which interfere with the ingress and egress of the blood stream as it flows through the network of capillaries situated in and beneath the uterine mucosa, producing a venous stasis. This chronic pelvic hyperemia can produce (1) alterations in the stroma or interstitial tissue by an increase of the round-celled connective tissue basis of the endometrium and (2) changes in the tubular glands situated in the stroma.

Two Histological Types.—(1) Interstitial endometritis, (2) glandular endometritis or glandular hypertrophy.

Chronic interstitial endometritis is the only form of chronic inflammation of the endometrium which can be admitted under the present pathological standards for Hitschman and Adler show that the so-called glandular endometritis is merely a series of physiological changes in the glands occurring in the course of the normal menstrual cycle.

The gland changes are simply an exaggeration of the physiological changes in the glands occurring in the course of the normal menstrual cycle. This glandular hypertrophy and hyperplasia may be so extensive as to form a new growth or overgrowth of these lymphoid structures.

Chronic interstitial endometritis involves the interstitial tissue or stroma of the endometrium or may follow acute inflammatory lesions of the uterus due to the infective organisms. The gonococcus is the most common causative agent; while the staphylococcus may be considered as the next most frequent incitor. The latter is commonly implanted in the uterus—postpartum or postabortive. The staphylococcus and some of the saprophytic organisms may also start up the inflammatory reaction.

Pathology.—The lesion is usually confined entirely to mucous membranes of the uterus associated with a chronic cervical inflammation, when however, the disease is of long standing there may be extension to the myometrium. The mucosa is swollen and thickened to 4 or 5 mm. and the surface is covered with a mucopurulent discharge.

Microscopically there is edema and exudation into the stroma. The edema varies according to the time in the menstrual cycle at which the scrapings are obtained.

The definite evidence of chronic inflammation is the presence of accumulations of round tissue cells and in the early stage the occurrence of plasma cells in the basal membrane.

In the well marked cases there is diffuse or partial infiltration of round cells in the interglandular tissue and round cell accumulations around the lumina of the glands; in addition to these stroma changes there is vascular dilatation and the formation of new vessels.

As a sequel of these changes we find a progressive fibrosis and thickening of the vessel wall. In some cases cure may occur without any permanent histological change in the tissues; this however is not the rule. Glandular changes, hypertrophy and hyperplasia seldom result.

Glandular Hypertrophy.—*Causes.*—The causes of chronic non-infective endometrical hypertrophy are conditions which produce *stasis in the pelvic or uterine circulation.* These are commonly:

1. Lacerations of the pelvic floor and cervix, allowing uterine descensus.
2. Uterine displacements or flexions.
3. Pelvic tumors and peritoneal adhesions.
4. Uterine tumor incarcerated in the pelvis or uterine polypi and adnexal disease.
5. Subinvolution of the uterus.
6. General visceral ptosis.
7. Chronic constipation.
8. Sexual excesses or masturbation.

Gonorrhea is probably the most frequent cause of subacute or chronic endometritis and should always be recognized before subjecting the patient to surgical measures.

Symptoms.—The symptoms are insidious but progressive; *a leucorrheal discharge is usually the first symptom that appears;* the discharge is a hypersecretion of the utricular glands, and is usually of thinner consistence than that in cervical catarrh, yet chronic cervicitis is commonly associated with endometritis and the secretions from the cervix become mixed with the uterine discharge, making it sero-mucopurulent. The leucorrhea is always more profuse just before and after menstruation.

Lumbosacral Pain.—Lumbosacral pain is often complained of; this is usually due to the causative lesion or the associated cervicitis and not to the endometritis except at the menstrual periods, when the weight of the organ is materially increased; the backache is always aggravated by walking or standing. If there is much descensus or associated adnexal disease there is pelvic tenesmus.

Menstrual Disturbances.—Menorrhagia, metrorrhagia and dysmenorrhea appear as later symptoms; when the mucosa becomes decidedly hypertrophied. Increased blood loss accompanies interstitial changes.

General Symptoms.—The general symptoms are those which result from general loss of tone and anemia as physical and mental depression, neuralgia, hysteria, occipital or vertical headache, and digestive disorders. Abortion and sterility are common. Both local and systemic disturbances are most marked just before and during menstruation.

Physical Signs.—The uterus is enlarged and the body is sensitive on bimanual palpation; exploration of the interior of the uterus with the sound shows an enlarged cavity, a thick, soft endometrium in the fungoid form with excrescences at the fundus and the tubal corners; *excessively sensitive*, especially at the *os internum and which bleeds easily on the touch of the sound.*

Differential Diagnosis.—Chronic endometritis must be distinguished from adenomatous, carcinomatous, and sarcomatous degenerations by the routine microscopical examination of all uterine scrapings; and clinically by the more profuse and offensive discharge in the two latter diseases. Pregnancy can be excluded by the absence of those changes (1) in the shape, (2) size, (3) consistency of the uterus common to gestation.

Fibroids are readily distinguishable by their *asymmetry*, nodular character and the increased density of the uterine mass.

Gonorrheal Endometritis.—Gonorrheal endometritis is recognized by the usual history, the clinical signs, chronic gonorrheal cervicitis and by finding the gonococcus in the discharges.

Tuberculosis of the endometrium is recognized by evidence of tuberculosis in other organs and by isolating the tubercle bacillus in the curettings. It should be the practice of all operators to have the curettings from every uterus examined by a competent pathologist, as many lives may be saved by this routine. The pathologist should know the relation that the time of curetting bears to the menstrual period.

Treatment.—The treatment should be directed to the *cause of the* chronic venous stasis, *i. e., relief of the constipation, reposition and retention of the displaced uterus, support of the visceral ptosis, etc.* This should be supplemented *by changing the circulation* in the uterus itself, *by hot vaginal douches of one gallon taken twice daily* with the water at a temperature of 115° to 118° F., in order to get a blanching effect on the pelvic tissues; the douche should be taken lying down, and after each douche the knee-chest position should be assumed for a period of five minutes. *Sleeping with the foot of the bed elevated ten or twelve inches further depletes the pelvic veins.* Walking on all fours (the monkey trot) night and morning empties the pelvic veins and massages the supports.

Colonic irrigations, with hot salt solution through a Kemp tube, relieves the congestion in the adjacent rectum and sigmoid.

Vaginal tampons of boroglyceride or ichthyol and glycerin, 1 to 5, repeated every second day, *applied with the patient in the knee-chest posture,* temporarily corrects retrodeviations and descensus of the uterus, thus improving its circulation.

Multiple puncture of the cervix with a uterine spear, especially the *puncture of retention cysts,* helps to diminish the congestion.

Intrauterine applications are dangerous and of questionable curative value, unless the application is made following *thorough dilation of the cervix. Intrauterine instrumentation always excites old parametric and tubal lesions.*

Bier's suction treatment applied to the cervix daily for four or five treatments is a valuable adjunct to the local measures already spoken of. Tonics, hygiene, sitz baths, physical exercise, especially walking, deep breathing and "setting-up" exercises all contribute toward improving the general circulation.

Curettage is indicated in chronic endometritis *with much hemorrhage,* which is otherwise uncontrollable, and is the most valuable means for removing the greatly thickened endometrium. *Curettage removes the hypertrophied* mucosa but does not cure the condition unless the cause of the venous stasis is also corrected.

Technic of Curettage.—The patient should be anesthetized and placed in the Edebohls' or Sims' position and after the vulvar hair is clipped, and the vulva, vagina, and surrounding surfaces rendered aseptic by soap and water, with gentle friction and prolonged saline irrigation. The pelvic floor is retracted by a suitable speculum and the cervix grasped and drawn down with volsella. The cervical canal is cleansed of secretion and sterilized with the tincture of iodine and then dilated with graduated Hegar sounds to a diameter of ¾ of an inch to 1 inch. The entire uterine cavity is now systematically curetted with a *sharp curette,* first anteriorly, then posteriorly, and then laterally, then across the fundus; next the cornua are cleared with a special small curette. The work is done with a *down stroke only,* the *cavity* is not irrigated, nor is a pack or drain introduced. *The empty uterus in the normal position will drain itself.* The uterus is replaced in the normal position and a vaginal pack of iodoform gauze placed in the vagina beneath and in front of the cervix.

After-treatment.—The postoperative management of a patient who has been curetted consists in *rest in bed* for from five to seven days and regulation of the bowels. Vaginal douches may be used after the tenth day if the *convalescence has been afebrile.*

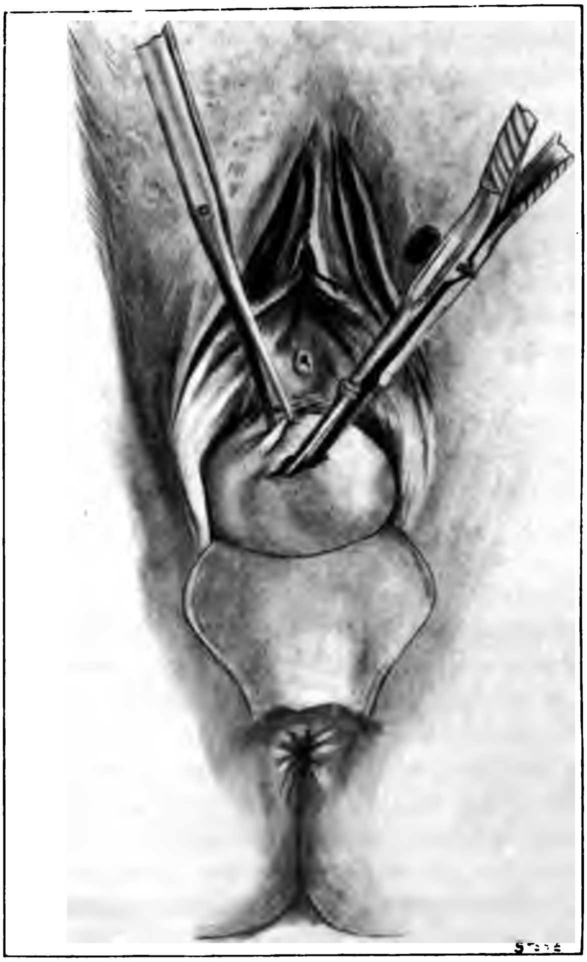


FIG. 93.—Technic of curettage. The cervix is drawn down with a volsellum on the anterior lip and a steel-branched dilator introduced.

Atmocauses may be substituted for the curette. This consists of the direct application of live steam to the uterine cavity. A special apparatus for the purpose is to be had of dealers in surgical instruments. The cervix is thoroughly dilated as for curettage and a cannula of non-conducting material passed into the uterus through which the steam at a temperature of 230° to 240° F., is injected into the uterine cavity for fifteen seconds. The vagina is protected by a wooden speculum. Atmocausis has resulted in collapse and death; and the cavity of the uterus has been obliterated by the deep cauterization.

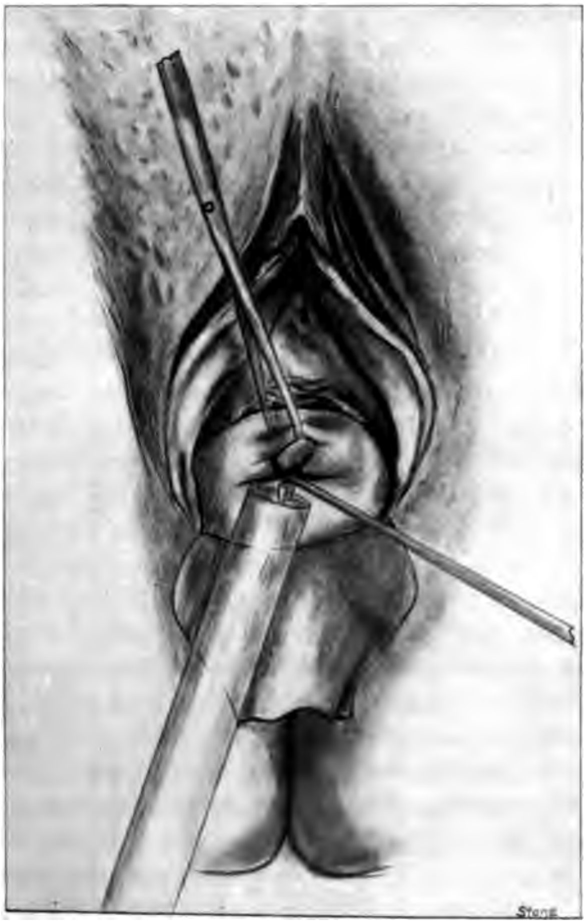


Fig. 94.—After the canal is sufficiently dilated the cavity is curetted and the curettings saved in a test-tube for microscopical examination.

It is contraindicated in endometritis when complicated by inflammatory lesions of the uterine adnexa. It has never had the endorsement of American gynecologists; and is mentioned partly for its historical interest.

Drugs for the control of menstrual hemorrhage due to endometritis are stypticin grain i to ij; ergotin grain i to ij; extract of suprarenal capsule grains iij or extract of mammary gland grains iij in capsules every three or four hours for several days before and during the period. In the intermenstrual interval hydrastis and ergot or their active principles should be employed.

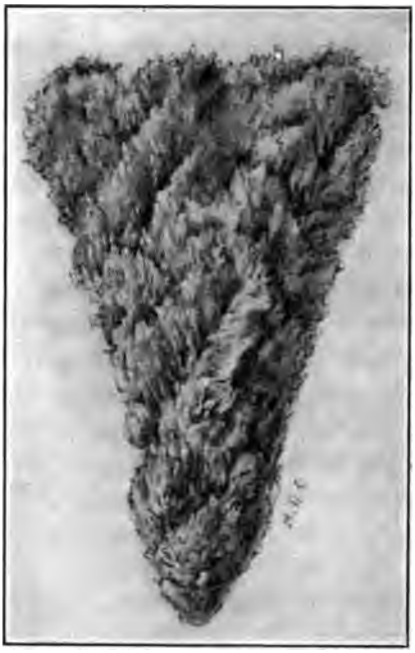


FIG. 95.—Cast expelled from the uterus in a case of exfoliative endometritis. (From the author's collection.)

Exfoliative Endometritis (*Membranous Dysmenorrhea*).—In this condition a more or less perfect endometrial cast of the uterine cavity is thrown off at menstruation; this cast may be expelled entire or piecemeal. Its expulsion is always attended with labor-like pains. Several theories have been advanced as to the cause of this exfoliation; (1) chronic endometritis which interferes with the separation and expulsion of the endometrium in fragments; (2) a diminution in the tryptic ferment of the uterine mucosa which normally softens and digests the mucosa preparatory to its extrusion; while others (3) have attributed the expulsion of the cast to some unexplained reaction in the endometrium resulting from hypofunction of the ovarian hormones.

Treatment.—*The treatment of membranous dysmenorrhea is more or less unsatifactory.* The severity of the uterine pain may be controlled for several periods by curetting the uterus a few days before the expected menstruation, after which the cavity of the uterus should be dried and pure carbolic acid applied to the curetted surface, the carbolic acid must be neutralized within *one minute* with alcohol. During the intramenstrual period the internal administration of ovarian extract and strontium iodide in 5-grain doses t. i. d. have been used with some success. It may be necessary to repeat the curettage in the course of a few months.

Senile Endometritis.—Senile endometritis is an atrophic process of the endometrium, in which there is necrosis and suppuration of the superficial layers of the endometrial tissue, owing to the diminished blood-supply and the incidence of infection; *this leads to the atrophy and disappearance of the utricular glands, destruction of the mucosa, and the substitution of a thin layer of connective tissue containing no glands, more or less imperfectly covered with cuboidal epithelium.* Atresia of the uterine cavity is relatively common and is produced by adhesion of the opposing denuded surfaces. When the adhesion occurs near the cervix the retained secretions distend the uterus, and produce the conditions known as hematometra and pyometra.

Symptoms.—*A seropurulent discharge which is more or less blood-stained, acrid and fetid is the most characteristic symptom.* The amount of the discharge varies, but it is always more profuse at the times at which the regular monthly period should occur. On inspection the signs of atrophic vaginitis are usually present, the discharge frequently produces a *pruritus vulvæ. Senile endometritis must always be differentiated from malignant disease of the body. The diagnosis may be readily made by microscopical examination of the curette findings.* Should dilatation permit the escape of retained purulent material, curetting should be postponed until culture of the interior of the uterus is sterile; for pyometra frequently has a virulent streptococcus in the retained discharges.

Treatment.—The disease is usually cured by curette and thorough cauterization of the uterine cavity or the intrauterine use of radium. Total extirpation may be necessary.

Tuberculous Endometritis.—Tuberculous endometritis is rarely a primary affection; it is usually secondary to tuberculous infection of the tubes and peritoneum; the endometrium about the tubal orifices is most frequently invaded, or it may occur as a manifestation of general tuberculosis. Tuberculous endometritis appears during adolescence, it occurs in the form of isolated tuberculous nodules or tubercles situated in the substance of the endometrium, which break down into irregularly shaped ulcers covered with caseous material. As the disease advances there may be considerable invasion of the muscular coat of the uterus. The destruction may be so extensive as to leave nothing but a fibroid sac containing gaseous material.

The condition can only be diagnosed by a microscopical examination of the uterine scrapings. Clinically a profuse purulent leucorrhea and the occurrence of menorrhagia when pulmonary tuberculosis is suspected or demonstrated, *suggests involvement of the endometrium.*

Treatment.—In tuberculosis of the uterus without adjacent lesion, the *uterus and tubes should be extirpated.*

Endotrachelitis. (*Endocervicitis—Catarrh of the Cervix*) is an inflammation of the cervical mucosa; sooner or later the deeper structures are always involved producing a cervical metritis, for the racemose glands in the cervix penetrate into the myometrium and when infected excite an inflammatory reaction in these tissues. The condition is usually due to a *gonorrheal or septic infection of the cervical mucosa* which involves the glandular crypts. The cervical mucosa evinces a marked susceptibility to infection and lacerations of the cervix, subinvolution, or misplacements of the uterus, or constitutional disease which increase the cervical congestion, favor the bacterial growth.

Acute infection of the cervix occurs in acute gonorrheal and in postpartal, postabortal and postoperative infections. The acute phase of the condition however, is so overshadowed by the associated lesions in the uterus and parametria that the infection passes to the chronic stage before receiving definite clinical recognition.

In chronic endocervicitis the mucosa of the cervical canal is swollen and often everted, while the mucosa of the portio about the external orifice presents a circumscribed area of apparent erosion or ulceration which is in reality a new formation of lymphoid tissue and overgrowth covered with a single layer of columnar epithelium *giving it a granular appearance. The continued congestion produces a hypersecretion of thick, viscid mucus* and ultimately hypertrophy and hyperplasia of the underlying muscle and connective tissue.

The glandular hyperplasia may result in the *formation of mucous polypi, adenomata, follicular cysts.* Ovula Nabothi are common when there is much hyperplasia of connective tissue; the content of these cysts is mucus, mucopus, or cheesy matter. A terminal cervicitis is the end result of all gonorrheal infections of the cervix. The infection may extend to the endometrium, although the gonorrheal form generally stops at the internal os unless the infection is carried upward by instrumentation.

It is not the laceration as such, if one is present, but the incidence of its infection that determines the morbidity of a cervical lesion, for the lymphatics of the cervix are continuous with those in the uterus and every infection incites its greatest reaction in the lymphatic system.

Leopolds' description of the lymphatic distribution in the uterus suggests the explanation of the far reaching permanent pathology which may result from a chronic cervical infection. The uterine lymph current may be traced from its lacunar origin in the cervical and corporeal mucosa, through minute funnel-shaped astra, directly to the myometrium. Here it branches into an extensive capillary network which spreading in the perimysium, penetrates and enmeshes every fascicle of the entire uterine musculature to its subperitoneal surface, when it drains into two main collecting channels that course parallel to the uterine and ovarian bloodvessels at the base and top off the broad ligament. It is, in infection, that this normal lymphatic development of the perimysial sheaths allows the ascending lymphangitis to produce a pathology which impairs the normal uterine contractions by infiltrating the myometrial muscle sheath and this in turn establishes a circulatory stasis which disturbs and perverts the menstrual function.

Clinical Course and Symptoms.—A laceration of the cervix is a starting point of chronic cervical catarrh in most cases, though the non-lacerated cervix may become infected.

The cervical lips become everted from the formation of scar tissue in the angle or angles, and the delicate epithelium of the cervical canal is exposed to the irritation of the vaginal walls. Injuries to the external os from instrumental dilatation will produce the same effect. The erosion in nulliparous women is due to the swelling and eversion of the intracervical mucosa. *Extensive erosion is always attended by some degree of cellulitis of the uterosacral ligaments* (posterior parametritis).

The prominent symptom in most cases is *leucorrhea,* which is profuse and usually viscid; either translucent or opaque, curdy, or it may be purulent when the inflammation is suppurative; *the discharge is always more abundant just before and after the menstrual period.* The patient often *suffers from menorrhagia,* owing to an associated endometritis and from lumbosacral pain due to the traction of the cervix on the thickened, tender, uterosacral ligaments. Sometimes all symptoms may be almost wholly lacking.

Physical Signs.—The os externum is patulous and the erosion is perceptible both to palpation and to inspection. By touch the finger detects the *soft, velvety character of the catarrhal patch; the enlargement and hardness of the vaginal portion of the cervix,* and *the round shot-like bodies* (*the distended Nabothian follicles*) under the surface, giving an irregular feel to the cervix.

On inspection in the nullipara, with her conical cervix, there is an inflammatory halo encircling a small pouting os, extruding a tenacious clump of mucus; while in the multipara the characteristic red color of the eroded area is visible and thick viscid mucus or mucopus is seen issuing from the os. If the cervix is lacerated the lips are hypertrophied and eroded and the extent and degree of the pathological change is apparent.

Differential Diagnosis.—Chronic cervical catarrh has to be differentiated from *malignant disease* of the cervix. In cancer of the portio the eroded area is surrounded by infiltration, is friable and bleeds easily.

A histological examination will make the diagnosis positive.

From Tuberculosis of the Cervix.—Tubercular ulcers of the cervix are sharply cut, irregular, and undermined. The microscopical examination of the biopsy specimen will show the presence of giant cells and tubercles as well as tubercle bacilli.

Treatment.—*The treatment should include attention to the general health* as well as treatment of the cause, *i. e.*, cervical lacerations should be repaired and malpositions corrected; in subinvolution and endometritis the size of the uterus should be reduced by local treatment, while gonorrheal and septic infections may be checked by appropriate local measures.

The circulation of the cervix may be improved by hot douches; its size may be reduced by daily tamponades, impreganted with ichthyol and glycerin. Cysts should be punctured. The erosions and the cervical canal may be cleansed of mucus with bicarbonate of soda paste, after which iodized phenol (equal parts of carbolic acid and tincture of iodine) should be applied to the eroded areas.

In gonorrheal infection, after the mucus is removed, daily applications of argyol 50 per cent; silver nitrate 5 per cent; or picric acid 1 to 100 have a curative action on the inflamed surfaces.

In extensive eversion, linear or circular cauterization of the surface of the cervical mucosa with a fine galvano-cautery knife, will usually cause contraction. The cautery should not be used in acute gonorrheal infection, as the reaction may cause extension to the uterus and tubes. Twenty-five mgms. of radium placed in the cervical canal just within the os, and held in position for eight hours with a suture will effect the same result as the cautery. In intractable cases with extensive erosion, marked hyperplasia, or cystic degeneration, the erosion and cervical canal may be excised after the technic of Sturmdorf, or the cervix should be amputated.

Metritis.—Metritis is an inflammation of the muscular wall of the uterus. It is usually preceded by acute endometritis of gonorrheal or septic origin. It may be acute or chronic; in the chronic form there is a marked increase of the connective tissue in the myometrium. Some degree of metritis always coexists in acute endometrial inflammation, whether the infection be septic or gonorrheal in origin. The muscular wall is thickened, soft and pulpy, the veins are generally engorged, the whole uterus is enlarged, and the peritoneal surface is covered with lymph. *Acute inflammation of the uterine muscle* is but a part of the general process in puerperal or gonorrheal infections.

On microscopical section the muscle bundles are seen to be infiltrated with pus corpuscles.

The acute process usually passes into the chronic stage with permanent thickening of the uterine wall and increased density of its tissue. The increase in the size of the uterus is in the fibromuscular layers, in which the histological changes are:

1. An area of round-celled infiltration just beneath the endometrium.
2. A general increase of the fibrous and elastic tissue in the myometrium.
3. Areas of hyaline degeneration in zones surrounding the larger vessels and distributed between the muscle bundles. The transition from metritis to fibrosis uteri depends on the prominence of the last two changes.

Symptoms.—In acute metritis the symptoms are those of acute puerperal or gonorrheal endometritis.

In the chronic form, which is the *sequel of the acute infection* or the result of *chronic hyperemia*, menorrhagia or metrorrhagia and pelvic tenesmus are usually complained of.

On examination the uterus is generally enlarged, dense and sensitive, with no alteration in its form. The cavity is enlarged and the uterus is usually more or less limited in motion, owing to the frequency of coexistent adnexal or parametrial lesions.

Treatment.—The treatment in the acute stage differs in no wise from that recommended in acute endometritis.

In the chronic form much may be done to diminish the passive congestion with douches, tampons, sitz baths, massage, curettage, and in the absence of adnexal and parametrial complications by establishing a better circulation by raising the uterus in the pelvis with a properly fitting pessary.

When the menorrhagia or metrorrhagia is intractable, atmocausis, radium or the roentgen ray, or hysterectomy is indicated.

CHAPTER X.

NEOPLASMS OF THE UTERUS.

Myoma.—Myoma (fibroma, fibromyoma, fibroid) is the commonest of uterine tumors, a non-malignant neoplasm found in 40 per cent of women who have reached the age of fifty years. The fibroid is composed partly of fibrous and partly of non-striped muscular tissue arranged in a disorderly interlacement of muscular and connective fibers which in the larger masses are grouped in more or less definite whorls resembling the knots in a piece of wood. Between the groups of fibers, run arteries, veins and lymph channels, derived from the normal vessels of the uterus, which at first ramify beneath the capsule of the tumor and then plunge directly into the interior. The origin is uncertain, many theories have been advanced but none have been proven. It is probable that many fibroids develop in connection with the coats of the bloodvessels in the uterine wall as congenital fetal misplacements of tissue and congenital rests appear as a solid growth due to a proliferation of the muscular and connective tissue elements of the myometrium around these different rest centers. *The development is limited almost wholly to the period of sexual activity;* it does not invade the wall of the uterus, but merely expands it. The growth is in the myometrium but not of it. Fibroids are usually multiple, not more than 1 or 2 per cent occur singly; they are commonly found in the uterus and in the posterior wall, and there may be as many as fifty or more individual tumors. They are equally frequent in the married and unmarried woman. Fibromyomata occur somewhat oftener in the full-blooded negro than in the white races. Their size varies from that of a pinhead to a tumor of 100 pounds or more in weight. The shape of the tumor is usually globular. Fibroids are classified according to their component parts; those containing an excess of muscular tissue being called myomata, and those in which the connective tissue predominates fibromata, and also according to their relation to the several coats of the uterus. *Nearly all fibroids are primarily intramural* and remain so or become *evolved inward or outward* by uterine muscular contraction according to the preponderance of muscular tissue on either side of the tumor.

1. *A fibroid situated in the muscular coat with muscle tissue* entirely surrounding it is called *interstitial* or *intramural.*
2. When the tumor grows toward the mucous membrane causing a projection into the uterine cavity carrying the endometrium with it and is covered with mucous membrane, it is classed as "a submucous fibroid," and when it becomes pedunculated within the uterine cavity, it is termed a "fibroid polyp."
3. When the growth is evolved toward the peritoneal aspect of the uterus, pushing the peritoneum before it, it is *subserous* or *subperitoneal.* The latter may become intraligamentous by spreading the folds of the broad ligament apart as it grows, or subvesical when it grows from the anterior wall of the uterus between the bladder and vagina, or when the tumor springs from the posterior face of the cervix it may raise the peritoneal lining of Douglas' pouch and become retroperitoneal; its bed being in the connective tissue below the rectouterine fold of peritoneum.

Tumors growing toward either the serous or mucous surface of the uterus *may be sessile or may become pedunculated.* The vascularity of the tumor is extremely variable, for as the growth is evolved toward the uterine surface it carries its capsule with it, and gets its blood supply largely from the surrounding tissue capsule, and frequently it is very scanty. It is because of this scanty blood supply that fibroid tumors are so prone to degenerative changes. The rate of growth is usually slow, more so in tumors having an excess of fibrous tissue and a limited blood supply. The tumor which remains in the substance of the uterus as an interstitial fibroid has a better source of nourishment, than one evolved toward either surface. The rapidity of growth is usually in inverse proportion to the age of the patient, the younger the patient the more rapid the rate of growth. The tumor rapidly increases in size during pregnancy, and rapidly become smaller after delivery; after the menopause changes in the size of the growth are uncommon. Just before each menstrual period a fibroid becomes larger and softer and may simulate pregnancy.

Myomata, as a rule, are distinctly circumscribed tumors, *being in but not of the surrounding tissues*, and are enveloped in a capsule of condensed muscular tissue from which they derive part of their blood supply.

Cause.—Little is definitely known as to the cause of fibromyomatous growths; it is supposed that they develop from congenital rests or fetal misplacement of fibrous tissue in and about the walls of the bloodvessels. No satisfactory explanation of their existence has yet been advanced. Curtis has recently proven the fallacy of the inflammatory theory in the study of the fibroids removed in St. Lukes' Clinic, Chicago. Trauma has never been recognized as an etiologic factor.

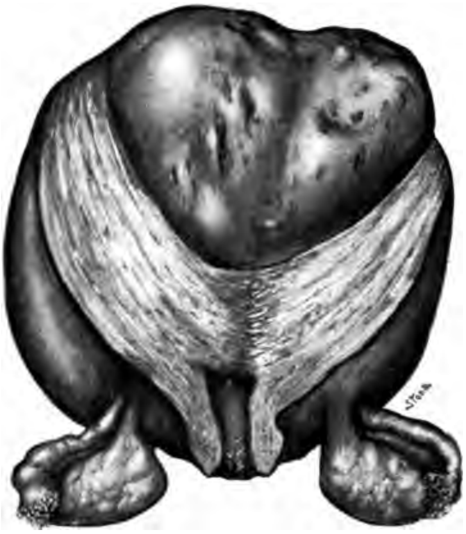


FIG. 96.—Large myoma of the anterior fundal wall (interstitial), showing the uterine cavity and ovaries below it.

Structure of Tumors.—Fibromyomata are made up of non-striped muscle fibers and fibrous connective tissue interlacing in all directions. *The density of the tumor varies according to the proportion of each.* In fibromata the fibrous element is in excess; while in myomata muscle fibers predominate. Primarily fibroids are made up *chiefly of muscular tissue. There is a relative increase in the connective tissue as the tumor grows;* this is specially apparent in tumors of slow growth. On the other hand, in rapidly growing tumors, the muscular tissue predominates. Ordinarily fibroids are encapsulated, *round, smooth, hard, and sharply defined.* On section they are *pinkish or whitish* and usually the fibers are arranged more or less distinctly in whorls.

The circulation comes from the capsule and the vessels enter from the periphery, so that the central portion of the tumor is generally less vascular than the periphery.

Single myomatous tumors are usually found in the lower uterine segment; they are apt to be soft and unencapsulated.

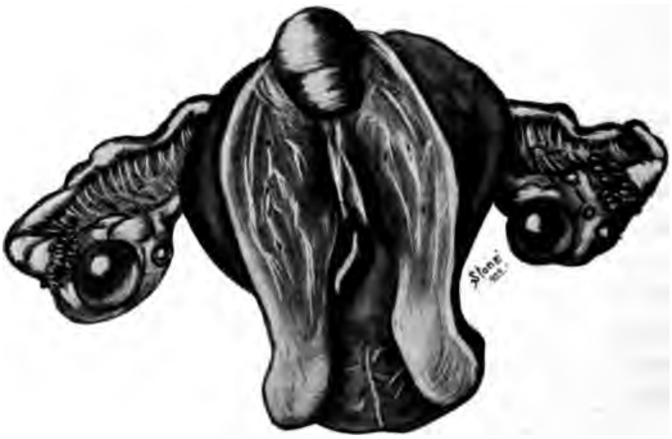


FIG. 97.—Drawing of uterus removed for metrorrhagia. Polyp in the cavity. Myoma in the fundus and double cystic degeneration of the ovaries.

Diffuse adenomyomata should not be considered under fibroids as their origin and course are different, they are believed to develop from glandular inclusions derived from the endometrium or from the mucosa of Müllers' ducts and are not encapsulated.

Fibromyomata *may undergo degenerative changes which rapidly change* the tumor from a benign to a malignant growth. About 3 per cent become transformed into sarcomata (myosarcoma) while myomata of the uterus seem to predispose to the development of carcinoma of the endometrium; serial sections of all myomatous growths will show nearly 3 per cent of carcinoma, either in the cervix or the body. The percentage of malignant degeneration increases with the age of the patient.

In cases of fibroid tumor the ovaries are frequently cystic and enlarged and inflammatory lesions of the tubes or ovaries complicate the tumor in about 54 per cent of cases coming to operation.

Structural Changes in the Character of the Tumor.—Fibroids may become *edematous. Edema is common in pregnancy,* but may also occur in tumors of the non-gravid state; *it is most frequent in subserous growths,* being due to an obstruction to the venous circulation in the pedicle (thrombosis of the efferent vessel). It is characterized by rapid growth and softening of the neoplasm.

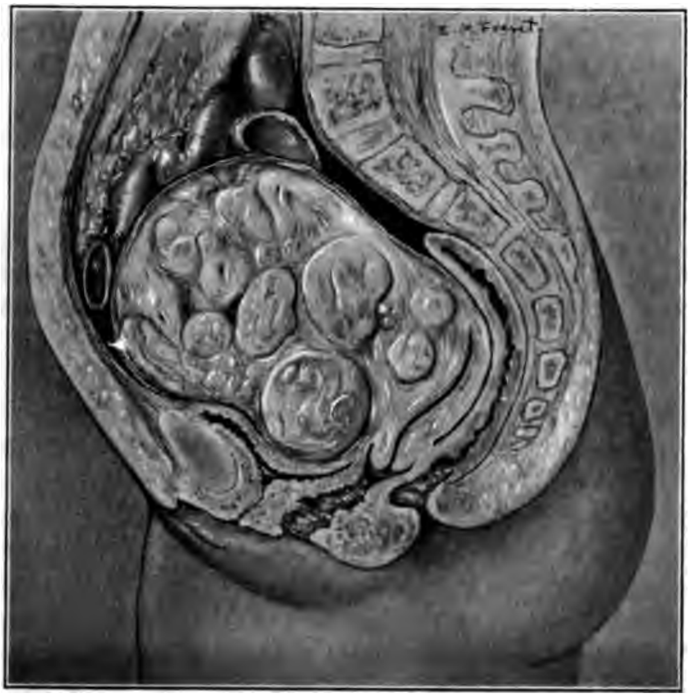


FIG. 98.—Multiple myomata packed in the pelvis compressing the rectum.

Edema may be considered as an early stage of necrosis. Fibrocystic tumors result from the breaking down and liquefaction of areas of hyaline degeneration in myomata. When this degeneration is extensive fusion of different foci may form a large cyst.

Atrophy of the tumor may take place; as a rule intramural growths cease at the menopause, or atrophy may occur after childbirth as a result of diminished blood supply.

Necrobiosis (*or red degeneration*) occurs from the sudden *cutting off of* the nutrition without infection. It is the commonest degenerative change after delivery. The tumor rapidly enlarges, becomes soft and painful and acquires a pink or deep red-purple hue. Fatty degeneration of the muscular fibers is another structural change which is most frequently found in small tumors.

Fibrous and Hyaline Degeneration.—Microscopical areas of hyaline degeneration may be observed in practically all myomata; such tumors are densely hard and microscopically the outline of the individual fiber is lost. These degenerations may result in the formation of cyst cavities by necrosis, owing to the sparcity of the central circulation.

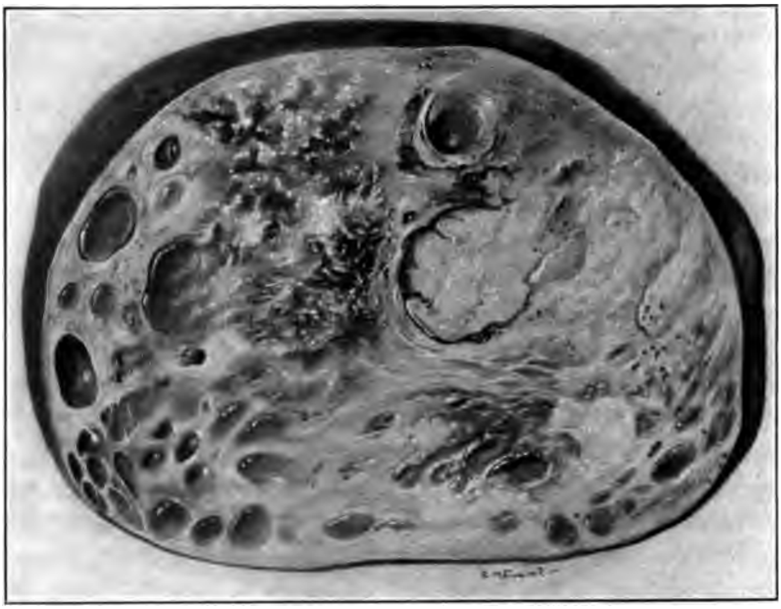


Fig. 99.—Cross-section of a fibroid tumor with diffuse edema. (From the author's collection.)

Calcification may involve all or a part of the growth; it results from a deposit of lime salts, chiefly phosphates in the tumor; this change is commonest in the subperitoneal variety.

Cystic degeneration results from a process of liquefaction associated with myxomatous softening or from dilation of the lymph channels.

The cystic spaces vary in size; occasionally they are of a size sufficient to give the tumor a fluctuant feel when palpated; sometimes the cyst spaces are filled with blood or a large blood cyst may develop; due to hemorrhage into the tumor from the dilated bloodvessels; such a change is telangiectasis.

Septic infection of a fibroid is not uncommon; it is usually due to breaking through the protective capsule by the introduction of an unclean sound or curette into the uterine cavity; suppuration and gangrene may follow, especially if the tumor is of the pedunculated submucous type.

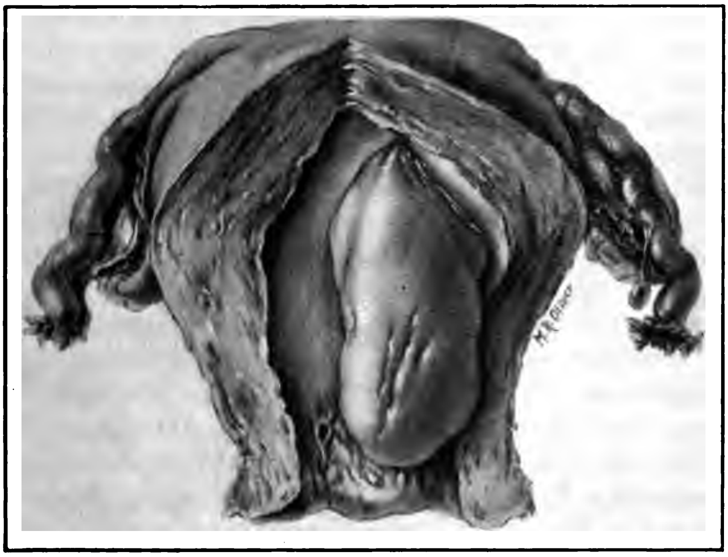


FIG. 100.—Submucous pedunculated fibroid producing metrorrhagia. (From the author's collection.)

Necrosis may occur from torsion of the pedicle (this has been noted in 4.5 per cent of subperitoneal tumors) or from pressure of the cervical rim in intrauterine polypi undergoing expulsion; which interferes to a greater or less extent with the blood supply of the tumor.

Sarcomatous degeneration is found in about 3.5 per cent of uterine fibroids. The sarcomatous areas are soft and brain-like in consistence and contain small hemorrhages; the growth invades the capsule and extends beyond it into the surrounding muscular wall.

Clinically there is a rapid increase in the size of the tumor and and increased uterine hemorrhage.

Carcinomatous invasion of fibroids may be demonstrated in nearly 3 per cent of all myomatous growths.

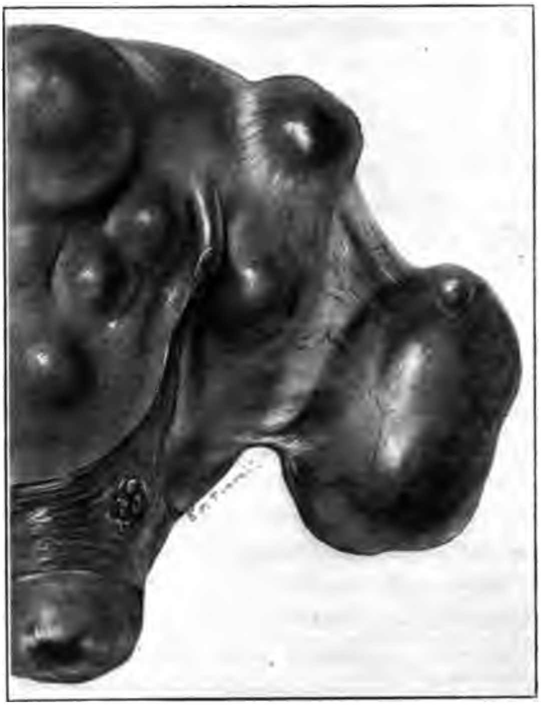


FIG. 101.—An intraligamentous fibroid simulating by its location a solid tumor of the ovary.

Fibroid tumors are benign growths and do not always impair the general health and often produce no symptoms, but because of possible complications in the adjacent structures and changes in the cardiovascular system, which are more or less constant, especially in tumors of large size and long duration the patient should report for observation at definite intervals. Some of the complications are adhesions *to the omentum, parietal and pelvic peritoneum, intestines or appendix, tubes, ovaries, or bladder,* or the formation of hydrosalpinx, or pus tubes in the pelvis, or the tumor may become incarcerated and block the ureters, producing hydroureter or hydronephrosis. Ascites is commonly present in subperitoneal growths and the appendages are diseased in about one-half of the cases.

Migration of the Fibroid.—Subserous and retroperitoneal tumors may become completely detached from the uterus by rupture, torsion, or atrophy of the pedicle. These aberrant tumors may be found free in the abdomen or form a secondary attachment to other structures.

Circulatory Changes.—Myoma patients frequently exhibit an increase in the pulse rate, palpitation and dyspnea, while murmurs may be heard at the pulmonic and aortic valves. The cardiovascular changes which occur in fibroids are not dependent upon the fibroid process or any specific toxin which the tumor liberates, but are primarily the result of anemia and faulty nutrition, infection and degeneration and predispose to thrombosis, embolism and phlebitis; all of the pelvic vessels undergo definite enlargement and structural changes. The heart muscle participates in this vicious cycle especially if the woman has been the subject of a large tumor for a long period, and has suffered from hemorrhage and pressure effects.

Symptoms.—The symptoms produced by fibroids may be classed as those that are:

1. Suggestive.
2. Characteristic.
3. Confirmatory.

The suggestive symptoms are:

1. Menorrhagia.
2. Dysmenorrhea.
3. Pressure effects—sterility or abortion.
4. Leucorrhea.
5. Anemia.
6. Digestive disturbances.

Menorrhagia.—Menstrual hemorrhage is common in interstitial and submucous growths; while intermenstrual bleeding is suggestive of a uterine polyp. The bleeding is not from the tumor itself, but from the associated hemorrhagic endometritis over and opposite the tumor mass, and is the result of a diapedesis through the walls of the endometrial capillaries due to venous obstruction. Neither does the amount of the hemorrhage depend on the size of the tumor, but rather on its location and its relation to the endometrium. The bleeding may be pronounced with small submucous growths near the fundus; it is most marked, however, *in uterine polypi and in soft and edematous fibroids. There may be no bleeding in subserous growths.*

Dysmenorrhea.—Menstrual pain is common in fibroids; in submucous growths it may be cramp-like, due to the uterine contractions excited by the growing tumor or the formation of blood-clots and the effort to expel them. It is sometimes due to the pressure of the myomatous uterus upon the surrounding parts. Pain is least marked in subserous tumors and exceptionally there is no pain.

Pressure Effects.—The pressure of the growing tumor may effect the function of the bladder, rectum, ureters or obstruct the venous circulation through the pelvis and produce a train of distressing symptoms. Pressure upon the bladder causes vesical tenesmus, frequent urination and catarrh of the bladder. Or the tumor may be pressed so firmly into the pelvis as to interfere with emptying the viscus, occasioning dysuria and retention of urine; or the ureter may be blocked and hydroureter or hydronephrosis result, or the pressure may be upon the rectum, interfering with defecation and the circulation in the hemorrhoidal veins, producing rectal tenesmus, proctitis and hemorrhoids.

Intraligamentous growths incarcerated in the pelvis may cause pressure on the pelvic veins or nerves and cause edema, varicosities and pressure neuritis in one or both lower extremities.

Leucorrhea.—The discharge from the uterus and cervix is usually increased, owing to the passive pelvic congestion which obtains in submucous and intramural growths. It may be mucoid, mucopurulent, seropurulent and fetid. The discharge whatever its usual character may be streaked with blood before and after the menstrual period.

Anemia.—The blood picture is one of a secondary anemia, which is progressive if the hemorrhages are profuse. The cardiovascular changes are directly or indirectly due to anemia. In a certain number of cases, the degree of anemia seems excessive in comparison to the amount of blood actually lost; when this condition obtains degenerative changes, necrosis, infection and suppuration in the tumor itself should be suspected.

Digestive Disturbances.—Digestive disturbances are frequently noted in the presence of large tumors which because of pressure or visceral adhesions interfere with the functions of the bowel and stomach.

Characteristic Symptoms.—The characteristic symptoms are apparent on physical examination and reveal a tumor connected with the *uterus or in it* and usually *enlarging it; the tumor is inseparable from the uterus, smooth, hard and sharply defined; the uterine canal is elongated and tortuous.*

The uterus is always enlarged, except in pedunculated subserous fibroids, when a tumor connected with the uterus and inseparable from it, with definite characteristics, can be demonstrated.

The course of the uterine canal is *always elongated and sometimes tortuous in intramural and submucous tumors.*

Small Tumors.—Small tumors may be felt as denser portions of the uterine wall, or as round, smooth, hard nodules in the body of the uterus, making it *denser* or *asymmetrical.* Some interstitial growths are incapable of detection.

Large Tumors.—Large tumors may be mapped out and their relation to the uterus determined by conjoined vaginal and abdominal manipulation, with the sound passed into the uterine cavity to locate the position of the uterus. Rectoabdominal palpation helps. Fibroid tumors are *smooth, globular or nodular and sharply defined, often multiple,* usually dense, sometimes soft and if fibrocystic, semifluctuant. In *subserous and interstitial growths the tumors moves with the uterus and is inseparable from it.* A uterine bruit is present in two-thirds of all myomata.

Intraligamentous tumors may be recognized by their initial relation to the uterus, displacing it upward and to one side of the pelvis; they are usually more or less fixed in the pelvis owing to their development between the folds of the broad ligament. The adnexa run over the tumor. The extent of the growth should always be carefully outlined.

In fibrous polypi the cervix is generally more or less dilated and may admit the finger, which may detect a firm, rounded tumor connected with the uterine wall. The tumor may protrude through the cervix.

Confirmatory Signs.—Discission of the cervix and exploration of the cavity of the uterus with the finger may be required to make the diagnosis in some intrauterine myomata. The outline of the tumor

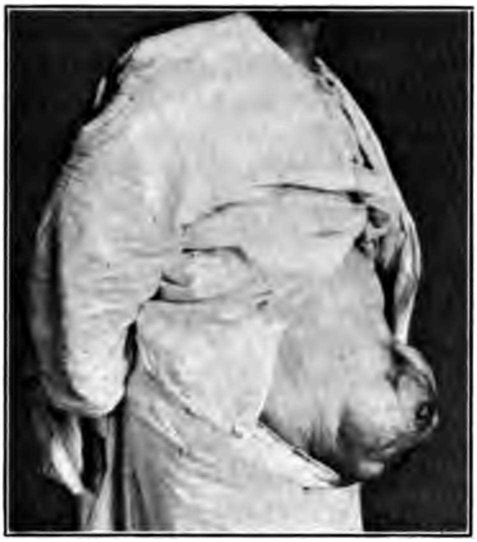


Fig. 102.—A fibroid uterus as a content of an umbilical hernia.

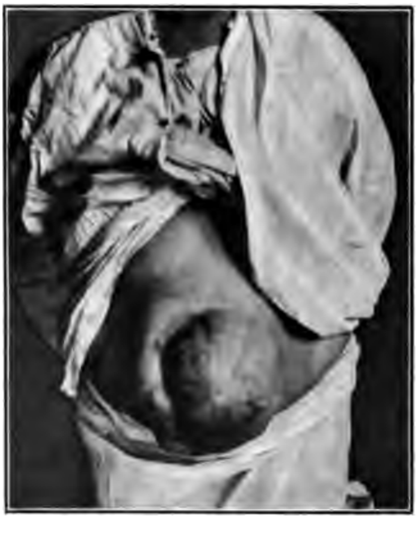


Fig. 103.—Subjected to hysterectomy and herniotomy, with recovery.

and the exclusion of pregnancy may be demonstrated with pneumoperitoneum and the roentgen ray.

Differential Diagnosis.—In all enlargements of the uterus it is absolutely necessary to *exclude uterogestion.* This may be done *(1) by noting the rate of the growth, (2) by the absence of the positive signs of pregnancy, especially of softening and elasticity of the body of the uterus and the absence of Hegar's sign.*

Uterine Fibroid.	Uterine Pregnancy.
Usual signs of pregnancy absent.	Usual signs of pregnancy present.
Tumor of firm consistency, rarely soft.	Tumor soft, elastic, isthmus compressible.
Intermittent uterine contractions absent.	Intermittent contractions present.
Irregular and asymmetrical in form.	Rate of growth regular, tumor symmetrical.
Slow growth.	
Cervix firm, not patulous.	Cervix soft and patulous.
Positive signs of pregnancy absent.	One or more of the positive signs of pregnancy present.

The *difference in the density of the two horns of the uterus in early uterogestation* may simulate myoma unless the examination is continued during contraction and relaxation of the uterus. Bimanual examination under surgical anesthesia will allow us to make the differentiation, for the elasticity of the uterus, when relaxed by anesthesia can never be mistaken for the dense, hard fibroid. Myoma and pregnancy may coexist. The diagnosis of pregnancy is often difficult or for a time impossible in the presence of myoma of the uterus. A uterine bruit is present in two-thirds of all myomata and generally absent in other pelvic neoplasms.

Differentiation of Ovarian Cyst.—In myoma there is commonly some history of menorrhagia; on the other hand, in cyst the menses may be irregular, absent or scanty. The abdominal distention and projection in a myoma are more abrupt than in the case of an ovarian cyst.

In myoma the enlargement is more apt to be asymmetrical, nodular and dense; while the contour of a cyst is smooth and it is fluctuant in consistency. On bimanual examination in myoma, the tumor is in, or is a part of the uterus, and the mass moves with the uterus as a whole. While it is usual in most cysts to demonstrate that they are distinct from the uterus, displacing it forward or to one side when the tumor is small and in the cul-de-sac or downward, backward and to one side when the cyst is larger than the pelvis and is in the abdomen.

The greatest difficulty in diagnosis is encountered when the cyst is intraligamentous, for in this class the only point of differentiation is the consistency of the tumor.

Ectopic gestation is distinguished by the history, by the signs of pregnancy, the presence of a sensitive, rapidly growing fluctuant tumor displacing the uterus, the sensitive cervix, and by the expulsion of the decidual cast *on death of the ovum.*

Malignant growths may be excluded by microscopical examination of the scrapings.

Metritis presents the greatest difficulties in differential diagnosis, especially if the fibroids are smooth and intramural.

In metritis the *enlargement is symmetrical* and does not exceed the size of the normal uterus more than two or three times. The *density is uniform*; *the uterus is usually more or less* restricted in its movements from parametrial thickening and the *body is tender to bimanual* pressure.

Inversion of the uterus may be confounded with a pedunculated submucous myoma. Inversion may be recognized *by the absence* of *the fundus and body of the uterus above the pubis, by the funnel-shaped depression in place of the fundus, by the presence of a tumor in the vagina, by the shape and character of the vaginal tumor,* and finally by the use of the sound, which fails to pass into the cavity.

Retroflexion is occasionally confused with fibroids of the posterior wall; the diagnosis may be made by the shape and position of the tumor, its relation to the cervix, and the position of the uterus as determined by the uterine sound.

Pelvic exudates may simulate myomatous growths situated in the broad ligaments or under the peritoneum. The history of previous pelvic inflammation helps materially in making the differention.

Pelvic hematocele is characterized by a more or less *abrupt development.* There is frequently a *history of pregnancy.* The *consistency is fluctuant or doughy.* The *tumor* is not *sharply defined* as in fibroids. Exploratory puncture through the cul-de-sac *gives blood.*

Tubal and ovarian masses may be recognized by their shape, location and density, and as a rule, *the uterus and tumor may be mapped out separately.*

Prognosis.—Uncomplicated fibroid tumors not reaching above the umbilicus, and which have ceased to grow, are commonly attended with little danger to life, but may be the cause of chronic invalidism. About 50 per cent of all fibroid tumors undergo some form of secondary degenerative change. *Unfavorable conditions are tumors of large size, rapid or continued growth, with abdominal pain or ascites, sepsis, persistent and uncontrollable hemorrhage, edema, telangiectasis, cystic or malignant degeneration or associated tubal, ovarian and peritoneal inflammation producing symptoms.*

Hemorrhage may become dangerous even when the tumor is small; for a secondary enemia so lowers the individual resistance *that intercurrent conditions affect the patient seriously.*

Uterine polypi are sometimes expelled spontaneously, but with more or less danger from sepsis and sloughing.

In pregnancy the rate of growth is greatly increased, partly by hypertrophy and partly by edema. Abortion or premature labor is common.

Tumors in the lower segment may cause serious obstruction at labor. Fibroids situated in any part of the uterus may give rise to postpartum hemorrhage or interfere with normal uterine drainage and cause lochial retention or infection.

Pedunculated subserous growths rarely offer any complications to delivery. *Torsion of the pedicle in subserous tumors is more frequent in the pregnant than in the non-gravid uterus.*

During postpartal involution small tumors may diminish in size or very rarely wholly disappear.

Thirty per cent of women with fibroids are sterile, owing to the frequency of complicating tubal and ovarian disease.

After the climacteric, intramural tumors may cease to grow or become smaller. The menopause seems to have little influence on subserous, submucous and fibrocystic tumors; rarely myomata of the interstitial type may disappear during the atrophic changes which take place at the menopause. At this time, however, degenerative changes are frequent and the growth may rapidly increase in size. The presence of a fibroid with pelvic adhesions may postpone the menopause for ten or fifteen years.

The operative prognosis shows a mortality of less than 2 per cent.

Treatment.—Small tumors producing no subjective symptoms, with no complications, and not growing require no treatment; however, *every woman who is the subject of a uterine fibromyoma should be under observation at definite periods.*

Certain authorities would operate in practically all cases to avert future trouble. The writer is of the opinion that such a view is too radical in the light of general clinical experience.

The treatment of fibroids may be considered under the following headings:

1. Palliative measures, as the treatment of troublesome symptoms, which should include the management of hemorrhage, pain and the results of mechanical pressure.
2. The use of radium and the roentgen rays.
3. Surgical measures.

Hemorrhage may be controlled or the amount of blood loss diminished by hot vaginal douches, the vaginal tamponade or the curette (this is contraindicated in all submucous growths except for diagnosis), supplemented by the generous use of ergot, mammary extract and hydrastis canadensis, or the intravenous use of a decinormal solution of sodium hydrate (Wight).

Pressure pain may frequently be relieved by posture, *i. e.*, the knee-chest position, or walking on all fours, and by wool tamponades saturated with ichthyolate of glycerin 25 per cent, applied to the vaginal fornix with the patient in the knee-chest posture.

Proper attention to the bowels is also important for the patient's comfort. Little can be done with palliative measures to relieve the pressure effects, except to displace the tumor upward by the employment of the genupectoral position. Tumors which are *adherent and incarcerated in the true pelvis,* obstructing the rectum or ureters and distorting the bladder, always demand surgical attention.

Radium and the roentgen rays properly filtered, may be used to advantage in the treatment of fibroid tumors for the purpose of bringing about (1) an artificial menopause; (2) to reduce the size of the growth; (3) to relieve pain; (4) to control hemorrhage when operative procedures are contraindicated, because of physical conditions in the patient which make operation hazardous. We are not in accord with some German authorities, notably Krönig and Gauss, who believe that the radium and the roentgen rays make operation unnecessary. Growths which have undergone cystic changes, infection or fibrous polypi and tumors complicated with adnexal and peritoneal inflammation, contraindicate the trial of radium and the roentgen rays.

Surgical Measures.—In most cases of uterine fibroid the treatment is extirpation of the tumor by myomectomy or hysterectomy. The contraindications to radical operation are grave organic disease of other organs, especially of the heart, lungs, bloodvessels or kidneys; It is therefore imperative that before deciding on operation, a careful examination of the blood, heart, lungs and of the kidney function be made by a competent internist.

Vaginal Myomectomy.—*Submucous tumors* may be enucleated per vaginam by torsion or morcellation, with or without anterior hysterotomy, and small subperitoneal and intramural tumors may be removed through the vagina by vaginal celiotomy.

Vaginal myomectomy may be chosen in fibroid polypi, submucous, intramural or subperitoneal fibroids of a size smaller than the fetal head, if the pelvis is roomy and not of the funnel type and if the vagina is relaxed. Rigidity of the vulvovaginal orifice can be overcome by incision.

Technic.—In fibroid polypi, with the cervix dilated or dilatable, the tumor may be drawn down with traction forceps and the pedicle twisted off or cut with scissors or severed with the cautery.

Submucous Fibroids.—With the cervix undilated or the tumor large, a sagittal section of the anterior or posterior uterine wall will be necessary before the tumor can be delivered; the bladder is first detached as in vaginal hysterectomy. Morcellation of the tumor may be necessary. The uterine and vaginal incisions are sutured after removal of the tumor, and the uterus packed securely for hemostasis. The pack may be removed within twelve to twenty-four hours.

Vaginal enucleation is contraindicated in the presence of pus tubes. Small subperitoneal fibroids may be removed by anterior vaginal celiotomy.

Vaginal Hysterectomy.—Vaginal hysterectomy is applicable in tumors not too large to be delivered entire or piecemeal through the vagina.

(*a*) *Clamp Operation.*—With the patient in the lithotomy position, the pelvic floor retracted and cervix held forward with a strong volsellum, an incision is made through the mucosa entirely around lower border of cervix and forward through the anterior vaginal wall to a point just behind the meatus, with scalpel or scissors. The bladder is separated from the uterus by blunt dissection with the finger-tips or with a gauze compress held in the fingers, working close to the uterus. Occasionally a closed, blunt-pointed scissors may replace the finger-tips or gauze compress.

A similar dissection is practised posteriorly and the peritoneum opened behind and in front of the uterus, well out on the broad ligaments. A gauze pad with tape attached is pushed into the posterior cul-de-sac to protect the intestines.

A blunt hook is now passed over the upper edge of the left broad ligament, anteriorly or posteriorly and the ligament is drawn down until the finger can be hooked over it and a strong cervical clamp forceps is placed on the ligament and locked with care so as not to include the intestines. Below, the grasp of the clamp must be close to the uterus, to avoid the ureter; above, the clamp is so placed as to include the ovary in the part to be removed or not, as may be desired.

Or the following method may be pursued: The anterior wall of the cervix is divided with scissors in the median line; the uterus is drawn down with traction forceps, one caught at each edge of the incision close to the angle; the incision is extended and the forceps are placed at higher points, and so on until the fundus can be delivered through the anterior vaginal incision and the ligament clamped in sections from above down.

The ligament is divided with stout scissors between the clamp and the uterus. The uterus is delivered and the opposite ligament is clamped and cut.

If preferred, each ligament may be clamped in sections, using two or three clamps for each.

If the uterus is too large to be removed easily as a whole, it may be divided sagittally or be taken away in smaller segments.

The gauze pad is removed. The peritoneum is cleansed of blood by sponging.

A moderately firm pack of washed-out iodoform or of plain gauze, in strips one and a half or two inches wide, is placed between stumps of broad ligaments and the vagina loosely packed with gauze around the forceps handles, the vulva being covered with a dressing of absorbent cotton, which is changed as often as soiled. The handles of the broad ligament clamps are securely tied to prevent unlocking. The clamps are removed in twenty-four to thirty-six hours.

(*b*) *Operation by Ligature.*—The peritoneum is opened in front and behind as in the clamp operation, and the openings extended to the broad ligaments.

The left index finger is passed behind the left broad ligament. The ligament is transfixed about one-third of an inch above its base and the same distance from the cervix with an aneurysm needle or Cleveland ligature carrier. A No. 2 catgut ligature is drawn into place and tied. The ligated portion of the ligament is cut with scissors close to the uterus. The second ligature is placed in like manner in the right broad ligament. The third ligature is inserted in the left broad ligament one-third of an inch higher than the first, and so on until both broad ligaments have been ligated and divided throughout.

If the pelvic peritoneum is infected a single mattress stitch brings together the anterior and posterior edges of the wound in the median line and a small gauze drain is inserted on each side. In the absence of infection the peritoneal flaps and vaginal edges are entirely closed.

Before closing the peritoneal wound, the round ligaments are brought together under the bladder in the median line and the stumps of the broad ligaments are drawn well down into the vagina and sutured in a V-shaped incision in the vaginal wall. This secures drainage for the sloughing stumps and tends to prevent subsequent prolapse of the vaginal walls. The uterosacral ligaments may also be sutured to the vagina.

Choice of Method.—The clamp operation is easier and quicker.

The ligature is less painful and permits the operator to secure the stumps of the broad ligaments by suture to the vagina and the partial closure of the peritoneum. Convalescence is more rapid.

After-treatment.—The bladder is emptied by the catheter for the first two or three days. Later the patient may sit up in bed to urinate.

The vaginal pack is removed in five to eight days and the vagina cleansed by dry sponging and lightly packed again or very gentle douching may be used after the sixth day. The patient should remain in bed for a week or ten days.

Myomectomy by Abdominal Section may be chosen as an alternative for hysterectomy in women of childbearing age, especially when the tumors are few, small or of moderate size and located in the uterine body. *The danger from hemorrhage, thrombosis and sepsis is somewhat greater than in hysterectomy.*

Technical Steps.—Injecting the uterine cavity with iodine; patient in the Trendelenburg posture; free abdominal incision, eventration of the tumor; tumor wrapped in gauze; and hemorrhage controlled by a rubber tube passed around the cervix or by rubber-faced intestinal clamps on the broad ligaments.

Incision around the pedicle of a pedunculated or across the summit of a sessile tumor. Enucleation of the tumor. Complete closure of the wound with interrupted catgut sutures. Bleeding in depth of the wound is controlled by mattress sutures. Special care is needed at angles of incision to stop the bleeding. Cervical ligature or rubber-faced forceps removed. Ovarian and uterine arteries may be ligated if required. The table is lowered when hemostasis is assured.

In large tumors if the uterine cavity is opened a cigarette drain may be left in the uterus. The abdomen is closed in the usual manner.

Abdominal Hysterectomy.—*Supravaginal Amputation.*—The length of abdominal incision is dependent on the size of the tumor.

After the tumor is freed from adhesions and eventrated, a clamp is placed on one ovario-pelvic ligament or between the ovary and the uterus if the ovary is to be left. The round ligament is included in the clamp. Both broad ligaments are also clamped close to the uterus.

The ligament is cut one-half inch within the outer clamp down to the lateral border of the uterus. The upper margin of the bladder is located and the peritoneum divided just above it, across the front of the uterus. The peritoneum and bladder are pushed down, separating the bladder from the uterus. The uterine artery is clamped with care to avoid the ureter.

The uterus is amputated at the level of the os internum, leaving the cervical stump cup-shaped. The remaining uterine artery is clamped well above the stump and the remaining broad ligament is clamped, including the ovarian artery. The ligament is divided in the same manner as the first.

The ends of both ovarian and both uterine arteries and veins are isolated and ligated with No. 1 catgut. Each is tied twice at short intervals. The ovarian arteries may be ligated in continuity as well. The round ligaments are ligated. The clamps are removed and any spurting vessels in the stumps of the ligaments are tied. The cervical stump is lifted with traction forceps, the canal iodized, and the muscular walls of the cervix closed with four or five interrupted catgut sutures passed antero-posteriorly or with a continuous suture.

The layers of each broad ligament are whipped together with fine continuous catgut sutures and *sutured to the cervix,* the ligament stumps being turned in and buried between the layers of peritoneum. The cervical stump is covered in by closing the peritoneum over it with sutures. The peritoneum is sponged dry and the abdomen closed.

Complete Hysterectomy.—After clamping the vessels on both sides dividing the ligaments and pushing down the bladder, the vaginal wall is transfixed with sharp-pointed scissors in the median line close to the cervix anteriorly and cut free from the cervix. The posterior vaginal wall is divided in like manner. A small section of vaginal wall and of parametrium remains at either lateral aspect of the cervix; this is caught in a clamp and cut away close to the cervix, the uterus in the meantime being held well up. The vessels are now tied individually, the clamps removed, and the operation completed as in supravaginal amputation.

Choice Between Abdominal and Vaginal Hysterectomy.—Advantages of the vaginal route in suitable cases are greater rapidity, less shock, and less injury to the peritoneum.

The advantages of the abdominal route are that in all cases it permits of greater thoroughness and in case of many adhesions it is safer; it should always be chosen in large tumors and generally in the presence of pelvic complications.

Diffuse Adenomyoma.—Diffuse adenomyoma of the uterus is a new growth consisting of myomatous and glandular tissue. Two classes of tumor have been observed:

1. Those situated at the periphery of the uterus and in the tube.
2. Those arising centrally; the former are supposed to arise from a numerical increase of the Wolffian tubules and the diffuse central growths from inclusion of the uterine mucous membrane. The adenomatous formation may be diffuse, more or less uniformly involving the entire uterine wall, or it may be limited to an area at one corner of the uterus. These growths are also found in the tube, the broad and round ligament and in the rectovaginal septum. Adenomyomata are not well circumscribed, or sharply defined like the myomata and have no limiting capsule.

Histology.—The histological features are interlacing bundles of fibroid and muscular tissue, enclosing within their strands patches of glands and stroma resembling the endometrium.

Cullen states that in his study of fifty uncomplicated cases of diffuse adenomyomata of the uterus, that he has been able to trace "uterine mucosa into the myomatous tissue." The islands of glands lying deep down in the myomatous muscle correspond identically with those seen in cases in which the continuity is traceable and are precisely the same as those found in the normal uterine mucosa."

In some cases minature uterine cavities are scattered throughout the myoma, the cystic spaces are filled with blood. This glandular tissue is undoubtedly an ingrowth from the endometrium, which Schwartz claims cannot occur unless the uterus is previously relaxed by existing disease; such as subinvolution or chronic metritis.

Symptoms.—The symptoms are generally the same as those of myomata, *i. e.*, an increase in the length of the menstrual period, with severe comenstrual pain due to the increase in the vascular tension within the tumor. The uterus may be asymmetrical but is never greatly enlarged. Inflammatory changes in the adnexa are common, particularly tubal adhesions.

The diagnosis is seldom made before operation. The treatment is hysterectomy—radium and the roentgen ray have little influence on these growths.

CHAPTER XI.

MALIGNANT TUMORS OF THE UTERUS.

CANCER OF THE CERVIX.

CANCER of the uterus constitutes about one-third of all cases of cancer in women; and nearly 90 per cent of all cases of uterine cancer originate in the cervix, a cervical carcinoma may have its origin in the mucosa of the vaginal position of the cervix, or in that of the cervical canal or its adjacent glands. Malignant disease of the cervix may occur at any age after twenty years. It is commonest between the ages of forty and fifty years and is seldom found in women over seventy. Recent statistical studies show that there is an actual increase in the prevalence.

Causes.—The cause of cancer is unknown. Certain conditions however, seem to predispose to the development of cancer these are: Age; heredity to a limited extent; inflammatory lesions; childbearing; lacerations of the cervix or other traumatisms supplemented by infection. The biological theory is supported by the fact that the repeated traumatisms finally induce an unlimited proliferation of the irritated epithelial cells which arrange themselves in a disorderly fashion and form an epithelioma; this is illustrated in cervical cancer which is found almost exclusively in women who have borne children; it being comparatively rare in nulliparæ, for only 3 per cent of cervical carcinoma develop in nulliparous women, and when such has been found there is usually a history of some previous operative trauma. That cancer is infectious has not yet been proven.

Classification of Cervical Cancer.—Cervical cancer may be classified according to its *histological; topographical;* or *morphological arrangement.*

1. Histological	Squamous-cell cancer; epithelioma of the portio; cylindrical-cell cancer; epithelioma of the cervical canal or adenocarcinoma of the cervix.
2. Topographical	Growing from vaginal portion; growing from cervical canal which may be either of squamous-cell or the cylindrical-cell type.
3. Morphological	Everting or vegetative, cauliflower, papillary, proliferating, inverting or infiltrating, nodular, ulcerative parenchymatous.

Long-continued irritation and chronic inflammation are probably the conditions which pave the way for the development of the new growth.

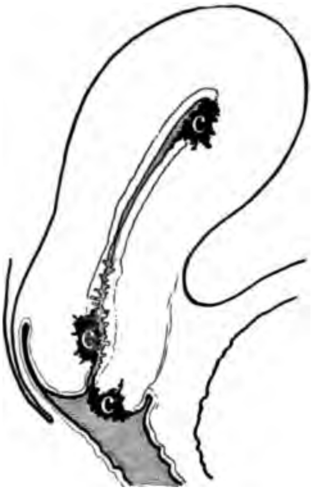


FIG. 104.—Locations at which cancer of the uterus is found. *C*, on the portio; *C*, in the cervical canal; *C*, on the endometrium of the body. Diagrammatic. (Kelly.)

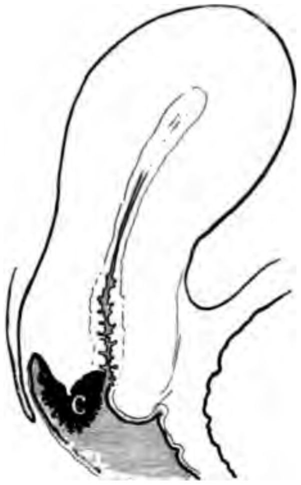


FIG. 105.—Progressive stages of portio cancer. Peripheral proliferation of the epithelial cells. Diagrammatic. (Kelly.)

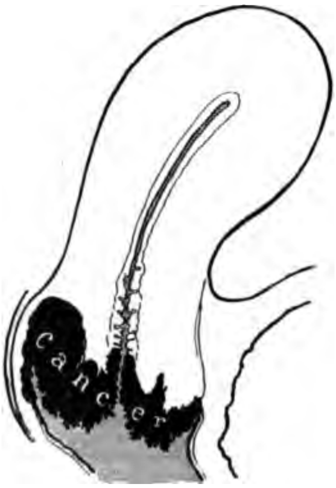


FIG. 106.—Progressive stages of portio cancer. Cauliflower growth. Diagrammatic. (Kelly.)

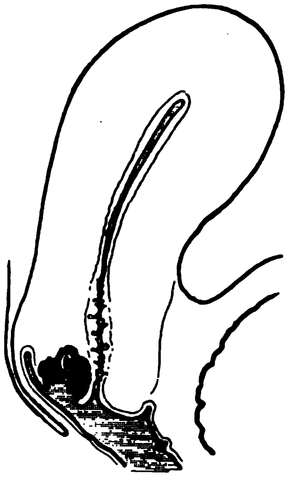
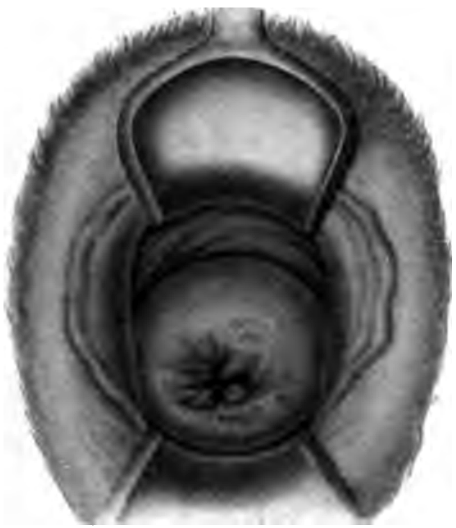
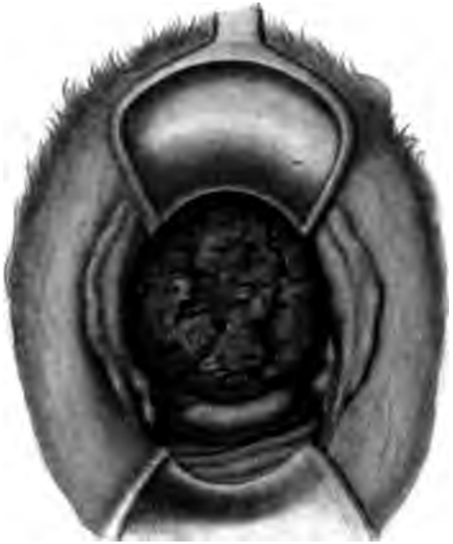


FIG. 107.—Progressive stages of portio cancer. Beginning tissue necrosis. Diagrammatic. (Kelly.)

PLATE VII



Cervical Lip is Nodular and Indurated, Friable and Bleeds Easily—Early Diagnosis.



Cauliflower Cancer-cell Proliferation Growing Downward.

(*a*) **Squamous-cell Cancer of the Cervix; Epithelioma.—Origin.**—It begins in the deeper layers of the stratified epithelium of the portio vaginalis. The cells proliferate rapidly and extend downward into the subjacent stroma in the form of solid plugs which on section

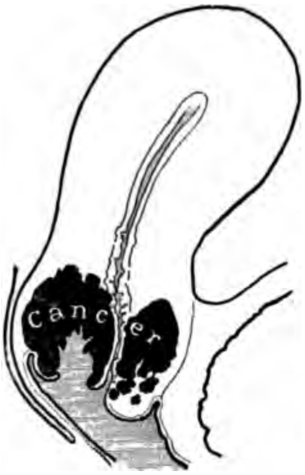


FIG. 108.—Progressive stages of portio cancer. Extensive necrosis. Diagrammatic. (Kelly.)

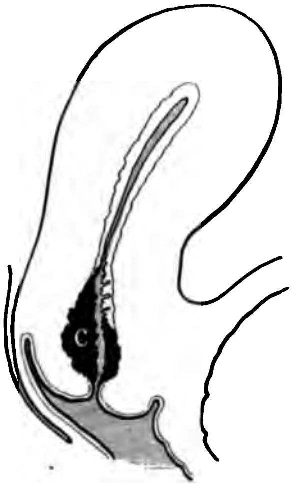


FIG. 109.—Cylindrical-cell cancer, beginning in the columnar epithelium of the cervical canal or cervical glands. (Kelly.)

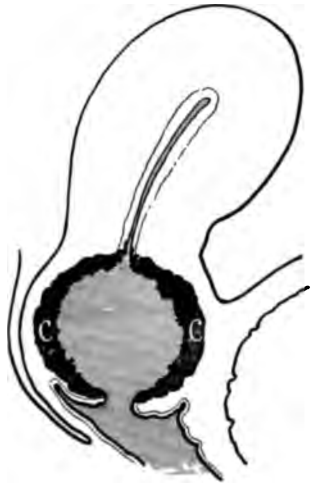


FIG. 110.—Cylindrical-cell cancer, showing rapid tissue destruction within the canal. (Kelly.)

appear as epithelial pearls. The cells of the periphery proliferate outward.

Beginning Stage.—At first the affected cervical lip is nodular and indurated, the nodules are glazed and bluish-white. The mucosa may be unbroken or eroded, and bleeds slightly upon examination. Later, a rapidly developing growth of wart-like vegetations may almost conceal the cervix. It is made up of delicate papillæ which are extremely friable and bleed easily. Ultimately the cauliflower growth breaks down, and tissue necrosis takes place. The cervix is replaced by a deep ragged excavation; the vaginal mucosa of the vault becomes invaded and later the parametrium, until the entire uterus and adjacent tissues are involved.

In squamous-cell the lymph glands are rarely invaded in the early stages and metastasis to remote organs is infrequent.

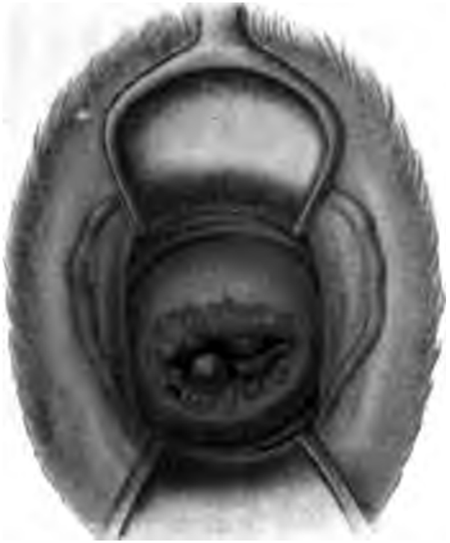
(*b*) **Cylindrical-cell Cancer; Adenocarcinoma of the Cervix.**—**Origin.**—In this type the cancerous growth begins in the surface columnar epithelium of the cervical mucosa, or in the tall columnar cells of the cervical glands.

The disease begins insidiously as a nodule in the cervical tissue. The cervix is *much denser and larger* than in squamous-cell cancer. The development is within the cervical canal, *so that the growth does not bleed early* unless a sound or other instrument is introduced through the external os. Later the mass breaks down leaving a sloughing cavity opening into the cervical canal. It is difficult of recognition in the early stages as the os may be inverted or glazed over. Occasionally it develops as a cauliflower growth, and its appearance at the onset may closely simulate that of chronic inflammation for before ulceration occurs the cervix is hypertrophied, hard and nodular. Malignancy is greater in cancer of the cervical canal than in cancer of the portio.

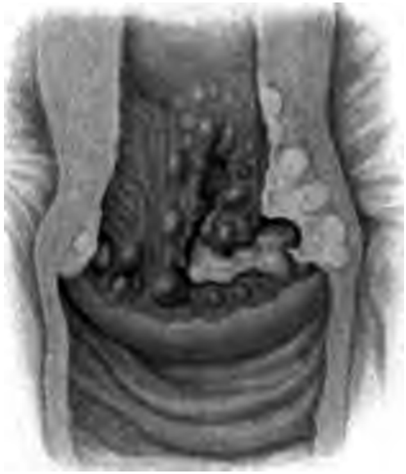
Mode of Extension of Cancer of the Cervix.—The disease gradually extends over the vaginal aspect of the cervix and outward along the lymph radicals into the cellular tissue of the parametrium in the broad and uterosacral ligaments, infiltrating them and limiting the mobility of the uterus, or downward along the vaginal mucosa infiltrating the vesicovaginal septum, or upward into the body of the uterus.

The entire cervix becomes destroyed in the ulcerative process and

PLATE VIII



Cylindrical-cell Cancer, showing Cystic and Friable External Os, without Apparent Change in the Contour of the Cervix.



Cylindrical-cell Cancer, Sagittal Section of Same Case, showing Extensive Changes within the Canal.

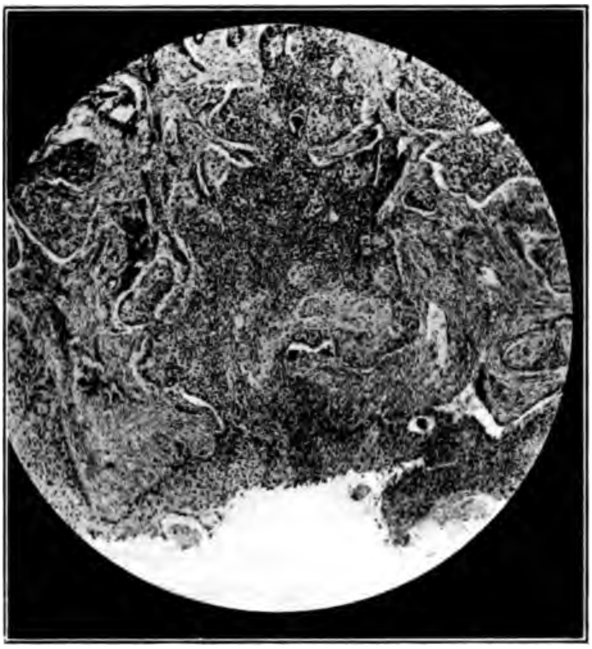


FIG. 111.—Epithelioma of the cervix.

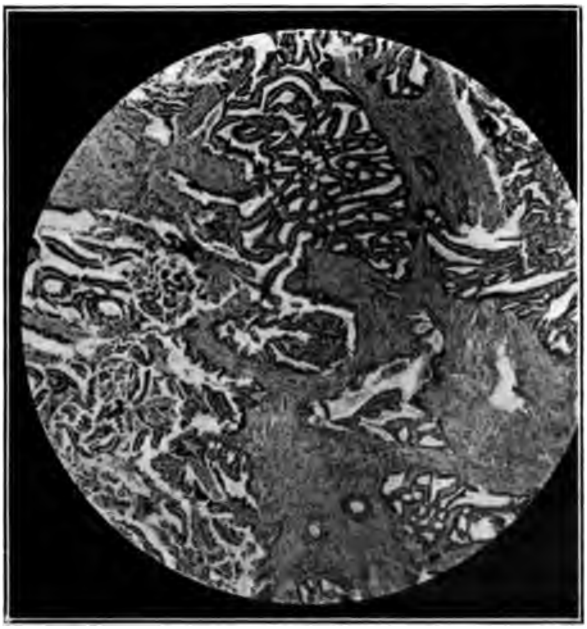


FIG. 112.—Adenocarcinoma of cervix.

replaced by a cavernous excavation in the vaginal vault which may finally communicate with bladder and rectum with resulting fistulæ. The ureters may be completely surrounded by cancerous infiltration, and the passage of urine obstructed by pressure with resulting hydroureter and hydronephrosis. Metastasis to remote organs is rare, as is true in all forms of uterine cancer except in the later stages of the disease.

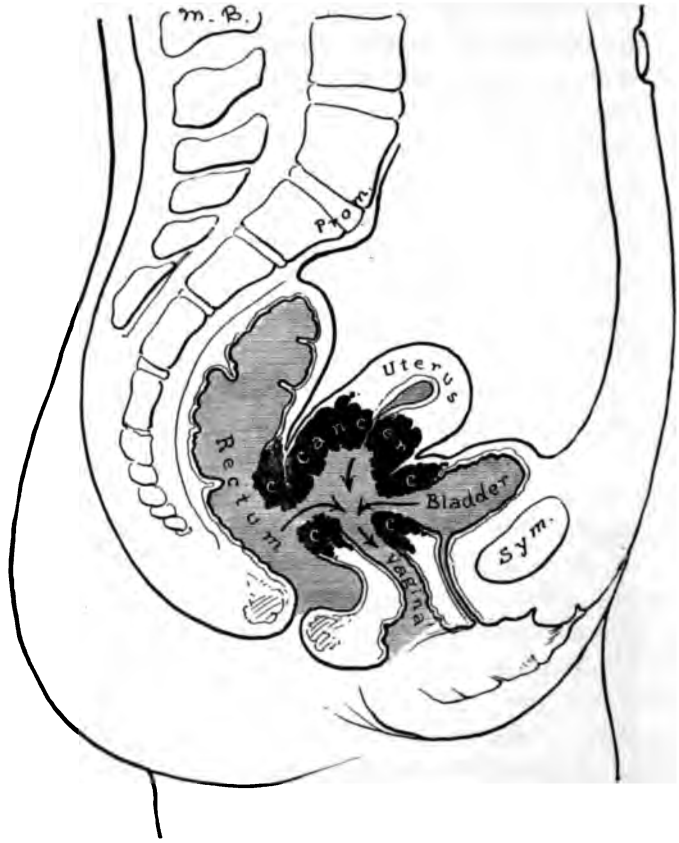


Fig. 113.—Cylindrical-cell cancer, showing extension into uterus, vagina, bladder and rectum.

The period of invasion of pelvic lymph glands is from one to six months after the first appearance of symptoms. The hypogastric glands situated around the iliac vessels are probably the first to be involved. The nearest glands are not necessarily first affected. *Glands may be enlarged and not be cancerous, or may be cancerous and not enlarged.* Enlarged glands are evidence of Nature's attempted resistance to the outward march of the cancerous invasion. Exceptionally the glands may be free from cancerous invasion in large growths or involved in small ones.

Cancer cells may also be found in the connective tissues, veins and lymph vessels of the parametrium.

Symptoms.—The principal symptoms of cervical cancer are: *Irregular vaginal hemorrhage (metrorrhagia), leucorrhea, cachexia, debility, pain and sepsis.*

The first symptom usually *is a slight watery or bloody intermenstrual discharge*; later it is profuse, bloody, purulent and fetid.

In the early stages the hemorrhage may occur as an intermenstrual metrorrhagia after exertion, straining at stool, coitus, use of the douche tube, etc.

Menorrhagia is uncommon. *Metrorrhagia is always suggestive. Any hemorrhage occurring after the menopause* should excite suspicion, and intermenstrual bleeding in women over thirty-five is especially significant of cancer.

Pain is not infrequent, but is seldom an early symptom.

The seat of the pain may be the back, sometimes the thighs, or remote parts of the pelvis. It is the result of tumor formation, carcinomatous infiltration and nerve pressure. There may be dysuria, vesical and rectal tenesmus; and in stenosis of the cervix, uterine pain due to the occurrence of accumulated secretions behind the tumor mass (pyometra).

Debility and loss of strength are late symptoms mainly due to the blood loss and putrid or septic absorption from necrotic changes in the growth.

Cachexia develops partly from the action of hemolytic substances in the blood, changing the character of the corpuscular elements and destroying the hemoglobin and partly as a result of hemorrhage and a disturbance of the excretory functions.

Emaciation is, as a rule, a late symptom.

Unfortunately the general health is usually not appreciably affected until the disease is well advanced and repeated hemorrhages from tissue necrosis have produced a secondary anemia.

Diagnosis.—The diagnosis is made by the *induration, ulceration, increased size of the cervix,* the nodular or cauliflower growth, its extreme friability, the fetor and its tendency to bleed easily on touch and finally *by the histological characters on microscopical examination; any case presenting suspicious ulceration or nodular growth should have the diagnosis confirmed by the microscope.*

Malignant degeneration has to be distinguished from syphilitic ulcer, from simple erosion, hypertrophy, cervical polypus, myoma, sarcoma, papilloma and tuberculous ulceration.

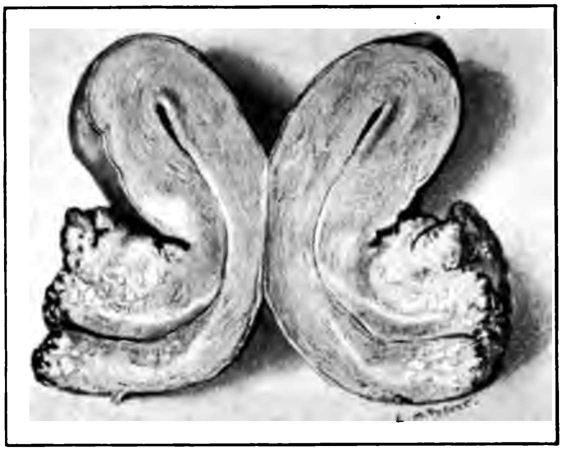


FIG. 114.—Epithelioma of the cervix showing the ingrowth of cancerous tissue. (Specimen from author's collection.)

In syphilitic ulcer the ulceration has a typical yellowish color and secretes a profuse yellowish discharge. The surrounding tissues are not infiltrated and there may be a peculiar puffiness of the fornices. The spirochæta pallida can be readily recovered from the secretion, or from the base of the ulcer with the curette. The Wassermann is usually positive and the lesion heals promptly with specific treatment.

In simple erosion with or without hypertrophy the exposed mucosa preserves the regular arrangement of its folds and is covered by clear mucus; with no surrounding infiltration and does not bleed on gentle manipulation. A 10 per cent copper sulphate solution coats the erosion with a whitish-blue film. Microscopical examination of an excised area must always be made when the diagnosis is questionable.

Cervical Polyp and Myoma.—Cervical polyps and submucous pedunculated myomata protruding from the external os may be mistaken for epithelioma. Inspection and palpation will show that the tumors lie within the cervical canal and are attached by a pedicle to a point within the canal or above the internal os. It must be remembered however, that polyps undergo malignant degeneration and that about 9 per cent of submucous myomata become sarcomatous, hence all pedunculated cervical growths must be removed for histological examination.

Tuberculosis of the cervix appears in the form of miliary tubercles scattered over the cervix, or as a papillary mass which bleeds readily or as a tuberculous ulcer. The only positive method of making the diagnosis is by microscopical study of the curetted tissue.

Before determining an operative procedure, it is well to note by rectal as well as vaginal examination whether the surrounding connective tissue is invaded, and whether the base of the broad ligaments and uterosacral ligaments are infiltrated and the adjacent glands are involved.

Prognosis.—The prognosis in cervical cancer is bad, *for every error in diagnosis in the incipient stage means a human life.* The duration of malignant degeneration is from one to three years, rarely more. One-third of the patients affected with cervical cancer die within one year, and more than two-thirds within two years. The progress is more rapid in the young and slower in those advanced in age, owing to the atrophy of the lymphatic system and changes in all the vessels.

Death is more rapid in cylindrical than in squamous-cell cancer of the cervix or in cancer of the body. Death usually results from exhaustion, sepsis, peritonitis or uremia.

The operative prognosis is better the earlier the operation is done. It is usually fairly good in squamous-cell cancer which has not invaded the vaginal walls or parametrium and in all cases in which metastasis by the lymphatics has not yet occurred and implantation is prevented. Less than 15 per cent of the cases operated on are alive after five years.

About 12 per cent of cases of cancer of cervix operated upon in Johns Hopkins Hospital remained free from recurrence after five years. The operative prognosis really depends upon the early recognition and early diagnosis of the disease by the practitioner. If a carcinoma has overspread the limits of the cervix the case is hopeless.

Treatment.—*The preventive treatment* is the repair or amputation of cervical injuries.

The curative treatment in the early stages is (1) by massive dosage of radium within the cervical canal and placed about the portio, supplemented by deep roentgen-ray therapy of the parametrial tissue, or (2) *radical abdominal hysterectomy* going well beyond the disease by a wide excision of the vagina, vaginal and cervical parametrium, and the removal of the tubes and ovaries. These procedures offer the only possibility of a permanent cure, though in the writer's practice, vaginal enucleation of the uterus after the method of Byrne, with the galvano-cautery has given a higher percentage of cures, than hysterosalpingo-oöphorectomy.

Vaginal hysterectomy may be chosen in nephritic subjects, in old age, when the abdomen is very fat and the pelvic outlet is ample, and in very early cancer of the body of the uterus.

When hysterectomy is elected, postoperative radiation of the vaginal vault and parametrial tissues should be done with radium and the roentgen ray. Hysterectomy is contraindicated when the bladder, rectum, broad ligaments, or lymph glands are invaded or when the vagina is extensively involved. As a rule, hysterectomy is contraindicated when fixation of the uterus is such that the cervix cannot be drawn to the vulva.

Technic of the Radical Operation.—1. The first step of the operation is preliminary cauterization with the electric cautery, removing all friable tissue and cauterizing the base of the remaining excavations.

2. Catheterization of the ureters before anesthesia makes their intra-abdominal recognition easier, though this is not necessary when the surgeon is properly trained in pelvic technic, gas-ether anesthesia with the patient gradually placed in the exaggerated Trendelenburg posture. An abdominal incision from the umbilicus to the symphysis protecting the wound edges with sterile towels, the intestines being held back with a hot damp pack.

3. Exploration with reference to the extent of the disease. The apparent involvement of iliac, lumbar or sacral glands, extension to

the bladder or the rectum, or wide extension in the parametria should forbid radical operation.

4. Ligation of the ovarian vessels beyond the tubes, tying in two places and cutting between with the cautery knife.

5. Ligation and section of round ligaments, well away from the uterus using the cautery.

6. Splitting the anterior fold of the peritoneum from one incision in the ovario-pelvic ligament to the other, across the front of the uterus.

7. Separation of the bladder by blunt dissection from uterus and vagina.

8. Lifting the anterior peritoneal flap toward the pubic bones and the isolation of the lower portion of ureter on each side, from the point where it enters the bladder to the parametrium. Without catheterization the ureter may more readily be exposed by splitting the peritoneum from the bifurcation of the iliac vessels down along its course. Care should be used not to injure the periureteral plexus of vessels.

9. Isolation of the uterine artery and vein by the blunt dissection and ligation without the point where the ureter crosses them, but with care not include the superior vesical artery, owing to the greater danger of cystitis if the superior vesical is cut off. Splitting the posterior peritoneum from one incision in the ovario-pelvic ligament to the other, across the pouch of Douglas, well back of the uterus.

10. Ligation and division by the cautery of the uterosacral ligaments, near their sacral attachments.

11. Freeing the vagina by blunt dissection on all sides, one-third the way down.

12. Ligation and division of the parametria, well out toward the pelvic wall. The uterus is drawn strongly to one side and the ureter of the opposite side is held well away and the parametrium clamped and cut as far out as possible, using the cautery.

13. If the iliac glands are to be dissected out, this should be done before the uterus is removed.

14. Clamping and amputating the vagina well below the cervix with the cautery knife—right-angled or curved clamps may be used, each engaging the entire width of the vaginal tube and the vagina cut between them.

It will be noted that all pelvic attachments of the uterus are divided with cautery knife—all vessels are ligated.

15. Vaginal stump is partially closed with sutures.

16. A light gauze pack is left in vaginal stump barely extending into subperitoneal wound.

17. Peritoneal flaps are sutured over the wound.

18. Abdominal incision is closed. The after treatment is the same as in any abdominal section.

Palliative Treatment.—Palliative treatment is indicated in all inoperable cases of cervical cancer to *limit the discharge, control hemorrhage* and *prolong life.* The cautery, radium and the roentgen ray accomplish this to a greater or less extent.

Cautery.—The diseased tissues are cut away with the cautery *which seals the lymphatics.* Curetting only *excites hemorrhage* and *spreads the disease through the lymphatics.* Special care must be taken to trim the edges of the vaginal wound of all cancerous fragments, so that when the cancerous cavern granulates in the cervix may be healed over with healthy vagina; in this way the disease is buried under a healthy vaginal vault and subsequent hemorrhage and discharge are diminished. The internal iliac and ovarian arteries may be ligated as a preliminary step before destroying the superficial cancerous area with the cautery, this starves the tumor and the growth is usually much slower. After sponging dry the base is cauterized with the Paquelin or electric cautery, and the wound cavity packed for seventy-two hours with gauze.

High amputation of the cervix in proliferating epithelioma of the portio, after the method described by Byrne in 1891, has given equal results to those obtained from hysterectomy. When properly done this procedure really consists in the removal of the whole uterus except a thin shell at the fundus, with dry roasting of the remaining excavation. This may also be preceded or followed by ligation per abdomen of ovarian and internal iliac arteries and those of the round ligaments which will cut off the arterial supply and favor periuterine inflammatory reaction. The ovarian arteries are ligated well out toward the pelvic walls; and should the uterine arteries be selected for ligation rather than the internal iliacs they are tied nearly three inches from the uterus outside of the vaginal branch. To tie the uterine artery the round ligament is pulled forward and the uterine tube backward. This lifts the artery from the ureter. The broad ligament is opened between the round ligament and tube and the peritoneal folds separated by blunt dissection. The uterine artery is then identified, drawn up with a blunt hook and tied.

Chemical Cautery.—Destruction of cancerous tissue with the chemical cautery has fallen into disuse since radium has come into popular favor. Of course where radium is not available zinc chloride in 50 per cent solution with a few drops of hydrochloric acid added, may be applied on small gauze compresses to the base of the necrotic cavity, after the thermocautery has cut away and trimmed the edges of the necrotic tissue and allowed to remain twenty-four hours. In the meantime the vagina is protected with tampons saturated with sodium bicarbonate, or applications of fuming nitric acid, once weekly, may be used with similar precautions. The pain and slough is considerable and the extent of the destruction cannot be accurately controlled.

The roentgen ray, radium and mesothorium have been used extensively in inoperable cancer *for the relief of pain,* to lessen discharge, control hemorrhage and arrest extension; and also after hysterectomy to prevent recurrence.

Radium therapy is today the accepted treatment in all inoperable growths and in those cases that border on the limits of operability. Radium as a curative agent has not had a sufficient trial to receive general endorsement. German authorities and Kelly and Burnam, in this country are convinced that cervical cancer is cured by radium and that parametrial extension may be limited by deep roentgen-ray treatment of the parametria. Fetor is controlled with vaginal douches of chlorinated soda—1 to 16, or of potassium permanganate —1 per cent solution. Other measures are local applications which are used to control hemorrhage and diminish discharge are acetone bisulphite applied to the cancerous area in the cervix through a Ferguson cylindrical speculum to protect the vaginal walls, repeated three times weekly for two months, thence once weekly. Or aluminum acetate, in full strength applied on tampons, which hardens the tissues as does acetone.

Important for *prophylaxis in women past middle life are the repair of cervical lacerations, amputation in cervical metritis, removal of all of sources of irritation if possible and histological examination of all tissues removed in doubtful cases.*

CANCER OF THE BODY OF THE UTERUS.

Origin.—Carcinoma of corporeal endometrium begins in the columnar epithelium of the free mucous surface or of the utricular glands. It usually presents itself in the form of adenocarcinoma, it is primarily a surface growth which may be ulcerative or papillomatous. It may be confined to a small area near one corner or take on a diffuse growth, spreading over the whole interior of the uterus, finally becoming fungoid in character.

Age.—Carcinoma of the endometrium is commonest between the fiftieth and sixtieth years, although Cullen has reported cases at thirty.

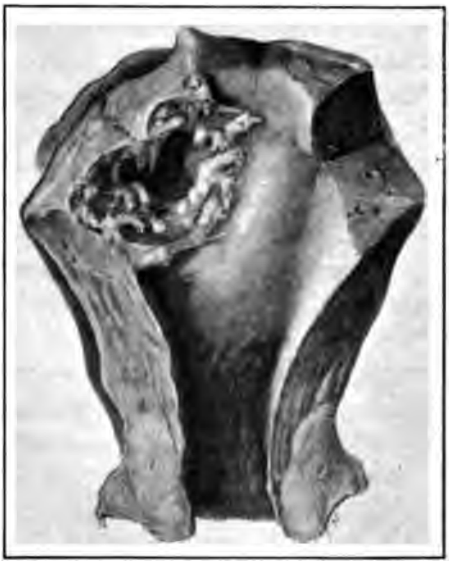


FIG. 115.—Adenocarcinoma of the body of the uterus. (Specimen from the author's collection.)

It occurs most frequently in nulliparous women, and is commoner after the menopause than cancer of the cervix.

Extension is by continuity into the myometrium, to the cervix, the peritoneum, and especially the parametrium, thence by the lymphatics to the upper lumbar glands.

The progress of the disease is slower than in cancer of the cervix, extension to the vagina is extremely rare. The growth is generally late in breaking down. This explains the absence of clinical symptoms for neither hemorrhage or discharge occur until there is superficial necrosis. As the disease advances the uterine walls become infiltrated and nodules appear under the peritoneum. The tubes, ovaries, bladder, and rectum are seldom invaded. Metastasis to remote organs is late, these are commonly found in the upper abdomen, in the liver, omentum and mesentary. *The lumbar glands are more frequently involved than the inguinal or iliac.*

Predisposing Causes.—*Endometritis and fibroid disease* especially myomata predispose to carcinoma of the endometrium by irritating the endometrium and lowering its resistance; fibroid tumors of the uterus are complicated by cancer of the uterine body in 1.54 per cent of the cases.

Pathognomonic Symptoms.—There are no early symptoms, the disease may be well advanced before the patient has any notice of intrauterine growth. *The first symptom is usually hemorrhage; menorrhagia if the woman is still menstruating; metrorrhagia after the menopause.* The bleeding may begin months or years after the menses have ceased. There is always *a thin, watery or blood-stained serous discharge in the intervals between bleedings, later the discharge becomes bloody, purulent, fetid, as tissue necrosis advances.*

Pain is late, though sometimes a marked symptom and is felt mostly in the back and shooting down the thighs. Pyometria with the intermittent discharge of blood-stained pus preceded by cramp-like uterine pain is sometimes the first symptom in very old women. In general the symptoms differ little from those of cancer, of the cervix. In the later stages the patient presents all the signs of a general cancerous cachexia.

Physical Signs.—There may be very little change in the size of the uterus in early cases or the uterus may be enlarged and ultimately become somewhat softened. The cervix is patulous, and the diagnosis is made by exploration of the interior of the uterus with the finger or curette and bringing away fragments of tissue for microscopical examination.

Carcinoma of the endometrium must be distinguished from endometritis, retained secundines, polypi, myoma, sarcoma, tuberculosis.

Curettage and microscopical examination of scrapings afford the crucial test.

Prognosis.—As a rule, without operation the prognosis in cancer of the body differs little from that of cervical cancer. After hysterectomy, 66 to 80 per cent may be expected to remain free from the disease when the operation is done before the parametria are involved.

Treatment.—The treatment is complete hysterectomy; vaginal or abdominal, with removal of tubes and ovaries. When the operation is done early, *the prognosis from surgery is much better than in cancer of the cervix,* since the parametria are involved later in corporeal than in cervical carcinoma. Radium, mesothorium and the roentgen ray have not given as good results as in cervical cancer. Radical extirpation as soon as the diagnosis is made is the accepted treatment.

Palliative operation by the Percy cautery is admissible in incurable cases. Hysterectomy may be justified to stop the hemorrhage.

Importance of Early Diagnosis of Uterine Cancer.—*In cancer of the cervix, as a rule, typical symptoms appear only after the growth has passed the operable stage. In at least 60 per cent of cases the disease is discovered too late for radical operation. The life of the patient depends upon an early diagnosis.*

The following symptoms demand immediate and thorough investigation:

Atypical uterine hemorrhage, no matter how trifling.

Watery vaginal discharge.

The slightest pelvic disorder of any kind in women past middle life.

A section of curettings, or of suspected tissue, should invariably be secured for histological examination. Adenocarcinoma of the cervix is more likely to escape early diagnosis than squamous-cell cancer.

Cancer of the body is still more difficult of early recognition except by the microscope.

SARCOMA OF THE UTERUS.

Sarcoma is one of the rarest forms of malignant tumor of the uterus. It may originate in the connective tissue of the cervix or in the body of the uterus. The proportion of uterine sarcoma to carcinoma has been variously estimated at one to twenty-four, and one to fifty. Sarcoma of the body is eight times more frequent than that of the cervix, for sarcomatous transformation is not an uncommon occurrence in uterine fibroids. Sarcoma of the cervix is extremely rare, but is most frequently found between the ages of forty and fifty years, yet no age is exempt.

Childbearing, traumatism and inflammatory lesions apparently have no part in the etiology.

Sarcomata may be classified as:

1. Sarcomata of the uterine wall (*a*) diffuse (*b*) circumscribed.
2. Sarcomata of the endometrium.
3. Sarcomata arising in preëxisting myomata.

Sarcoma of the uterine wall is the rarest form of the disease. It causes a uniform enlargement of the uterus, which from its softness and shape closely resembles the pregnant uterus; the cavity is enlarged and the endometrium is thickened. Round or spindle-shaped sarcomatous cells are found diffused throughout the entire thickness of the uterine wall, lying between what is left of the muscle fibers.

Diffuse Sarcoma of the Endometrium.—Origin.—The growth begins in the interglandular connective tissue of the mucosa usually at or near the fundus, and while it may spread so as to involve the entire mucous membrane of the body, it commonly stops short at the internal os and does not affect the cervix. It appears as a friable papillary growth of brain-like substance projecting from a circumscribed area, or it may involve the whole surface of the mucosa. It is highly vascular, its consistence is soft, its shape ragged, or polypoid, and as it extends it invades the myometrium and forms nodular masses on the peritoneal surface of the uterus which become adherent to adjacent organs. Extension is by continuity or metastasis. In the later stages ulceration and sloughing destroy the parenchyma, transforming the uterus into a large crater-like cavity. Small round cells usually predominate.

Sarcoma is hardly less rapidly fatal than carcinoma.

Myosarcoma or Sarcoma Arising in a Preëxisting Myoma.—Origin.—The disease usually begins in a myoma near the center of the tumor and is rather sharply differentiated from the surrounding myomatous tissue. The sarcomatous area presents the usual homogeneous cheesy, yellowish, brain-like appearance with hemorrhagic areas and cystic spaces, or instead of being circumscribed the sarcomatous areas may be diffused between the wavy bundles of fibrous and muscular tissue as nodules of varying size, which grow toward the mucosa or the peritoneum. Its consistence may be soft or hard. The cells are spindle shaped, apparently derived from the non-striped muscle cells. The growth may reach a large size or become pedunculated and form a polypus. Metastatic nodules may appear in the vagina, the peritoneum and in remote parts of the body.

Grape-like Sarcoma.—Grape-like sarcoma is extremely rare and very malignant; it usually springs from the mucosa of the cervix and forms masses of cysts. Histologically the cells are round and spindle-shaped.

Symptoms.—The symptoms of sarcoma are similar to those of cancer, especially in the diffuse form. Fibrosarcoma may resemble myoma, but grows faster, and is more painful. Profuse hemorrhages and watery discharges are late symptoms unless the growth is submucous or attacks a fibroid polypus.

Diagnosis.—The diagnosis is made by the microscope, *yet examination of curettings are not wholly reliable, since the endometrimm may not be involved.* The uterus is generally enlarged and in fibrosarcoma is nodular.

Prognosis.—The length of life seldom exceeds three years. The small round-celled type is the most malignant.

Treatment.—The treatment is complete hysterectomy, as in carcinoma, with removal of the adnexa; *partial extirpation favors metastasis.* Inoperable cases may be treated as in cancer.

CHORIOEPITHELIOMA—DECIDUOMA MALIGNUM.

Chorioepithelioma is a form of malignant disease which develops as a hemorrhagic, friable tumor situated most commonly in the cavity of the uterus occupying the fundus or anterior or posterior uterine wall at the placental site, from the epithelial covering of the chorionic villi, either during pregnancy or after labor.

It occurs only after the pregnant state; in 40 to 50 per cent of cases it develops after vesicular mole, as in hydatid mole; it is not infrequent for chorionic villi and masses of trophoblast to be left adherent after expulsion or removal of the mole. The period of development varies from two weeks to four years after pregnancy.

The characteristic histological elements are:

1. Multinucleated, irregular masses of protoplasm in which no definite cell boundaries are recognizable corresponding to the syncytial layer of the chorion epithelium.

2. Small well defined polyhedral cells with large vesicular nuclei packed together in masses without any connective tissue stroma between them.

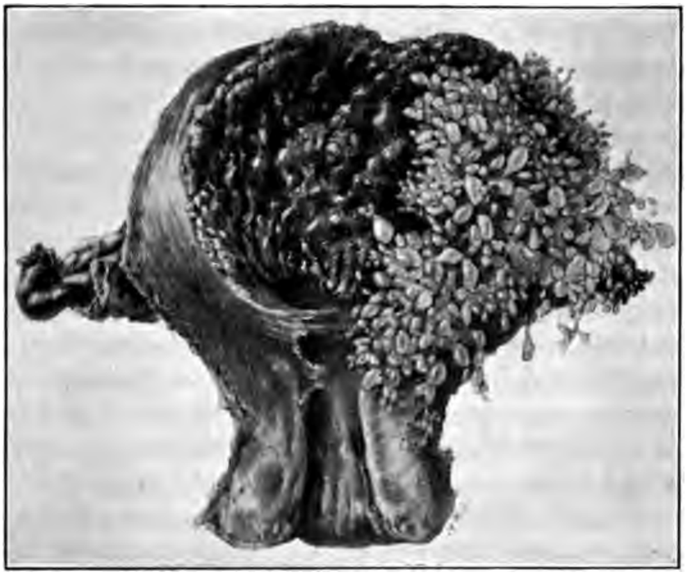


Fig. 116.—Chorioepithelioma and hydatid mole. (From the author's collection.)

3. And mononucleated or multinucleated cells of all shapes and sizes found infiltrating and destroying the adjacent tissues after the manner of sarcoma.

These are imbedded in the cellular tissue of the uterine wall, eating into the bloodvessels, allowing a further escape of blood into the intermuscular spaces.

The growth invades the uterine wall, replacing the histological elements of the latter with giant cells and small, round, connective-tissue cells. *The most superficial areas undergo rapid and early* *necrosis; extension is early and diffuse by way of the venous stream,* and by metastasis it may reach the vagina, broad ligaments, lymph glands, ovaries, liver, kidneys, pancreas, stomach, spleen, intestines, heart, lungs and brain. In fact it may by metastasis develop in any remote organ, the uterus remaining relatively healthy.

The disease is most frequent in women between twenty and thirty-five years of age.

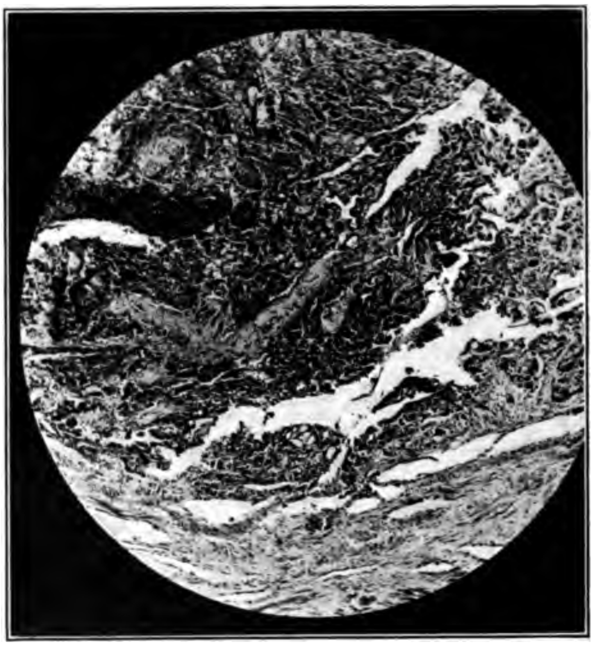


Fig. 117.—Chorioepithelioma.

Origin.—The origin of the growth is in the epithelium covering the chorionic villi, *i. e.*, (1) the syncytium, the external or the uterine epithelial layer of the chorion; (2) the internal, the ectodermal, or the epithelial layer of the chorion, or in Langhan's cells; in the uterus at the placental site or in the Fallopian tube after tubal pregnancy.

Symptoms.—*The symptoms are a profuse, watery, bloody, usually fetid discharge following labor or abortion. Uterine hemorrhage is a constant symptom,* the bleeding is severe, sometimes continuous, and may occur from two weeks to four and a half years *after a condition of the pregnant state, associated and alternating with a profuse, constant, fetid watery discharge,* and as necrosis takes place *masses of tissue are expelled.*

Anemia is an early symptom and may be profound.

Metastasis and consequent manifestations in remote organs take place early; hence early cachexia, extreme emaciation, and exhaustion are the rule.

The pain is cramp-like, often severe, is referred to the region of the uterus, *and begins early.*

There is usually a *rise of temperature and pulse* for necrosis, infection of the growth and septic absorption occur early.

Physical Signs.—The physical signs show a rapid growth of uterus. The cervix is soft and usually sufficiently patulous to admit a finger. *Digital exploration of the cavity reveals a tumor in the uterine wall at the placental site;* at first nodular, later the finger detects a soft, friable growth in the uterine cavity, together with blood-clots, in which the histological characters of chorioepithelioma may be demonstrated. The uterus is sometimes fixed by adhesions, owing to the tendency of the growth to extend to the perimetrium.

Rarely the growth may be found primarily in the vagina.

As a precautionary measure after expulsion of a vesicular mole, all placental tissue should be removed. Two or three weeks later the uterus should be curetted and the scrapings submitted to histological examination.

Unexplainable uterine hemorrhage within a few months after labor or abortion should always be regarded with suspicion and justifies a curettage or digital exploration for diagnosis.

Prognosis.—The malignant varieties are usually fatal within three to six months; almost surely before the tenth month; yet cases have been reported in which a spontaneous cure of the original tumor has taken place following curettage, likewise metastatic growths have disappeared after the operative removal of the primary focus.

Treatment.—*Repeated curretage is contraindicated, since it favors metastasis. Once the diagnosis is made a total hysterectomy with the removal of both ovaries and tubes is the procedure,* even when the disease has extended beyond the uterus or there is evidence of metastasis; hysterectomy is not contraindicated, as in a limited number of cases a cure has resulted, for it is never positive before removal as to the variety of chorioepithelioma that is being dealt with. Recent authorities describe three varieties: (1) Syncytioma, which is benign; (2) chorioadenoma destruens, malignant; (3) and choriocarcinoma, probably always fatal. Treatment of (1) is curetting; treatment of (2) is immediate hysterectomy; treatment of (3) is hopeless.

CHAPTER XII.

THE UTERINE TUBES.

MALFORMATIONS OF THE FALLOPIAN TUBES.

THE following anomalies of the Fallopian tubes have been observed:

1. Duplication of the uterine orifice or of the fimbriated extremity or of the entire duct.
2. Excessive development.
3. Imperfect development.
4. Defective development of the fimbriæ.
5. Absence or partial development of one tube is usually associated with the absence or a similar condition of the corresponding half of the uterus.
6. Absence of both tubes; here the uterus, as a rule, is also absent.
7. Pedunculated cysts; torsion; diverticula; excessive convolutions; the latter may partly occlude the lumen.

DISPLACEMENTS OF THE FALLOPIAN TUBES.

Displacements of the Fallopian tubes may be congenital, but are most commonly acquired. Acquired displacements are most frequently downward beside or behind the uterus from increased weight. The tube is occasionally found as the content of a hernial sac.

SALPINGITIS.

Salpingitis is an inflammation of the Fallopian tube which is caused by bacterial infection, nearly always secondary to an infection of the uterus or peritoneum.

The infecting organisms reach the tubes: (1) by extension upward, along the endometrium; (2) by extension downward from the peritoneum; (3) from distant foci through the blood stream; (4) by direct extension from other adherent and diseased structures.

Causes.—*Sepsis and gonorrhea are the most common causes—most frequently the latter*—inflammations from these origins are nearly always an upward extension from the uterus.

Tuberculous infection occurs in about 8 per cent of the cases, and may be of hematogenous origin. Salpingitis may be produced by other pyogenic organisms, or the exanthemata. Here again the infection is usually secondary to an endometritis—rarely to a peritoneal or hematogenous infection.

When salpingitis occurs, before puberty, it is almost always gonorrheal or tuberculous in origin.

Salpingitis may be either acute or chronic in character. The inflammation is usually bilateral, though only one tube may be involved at a time.

Acute Salpingitis.—Clinical and Pathological Characteristics.—Septic salpingitis is generally acute at the onset and is a common sequel in postabortal infection. On the other hand—in postpartal infection the parametrium is more commonly involved and the reaction in the peritubal tissues make up the pathology. The gonorrheal variety is nearly always subacute or chronic, involving the endosalpinx.

The tuberculous form is chronic—and usually occurs by secondary extension through the blood channels.

Endosalpingitis (of gonorrheal or mixed origin).—The inflammation begins in the mucosa, but finally all coats of the tube become involved, causing endosalpingitis, myosalpingitis and perisalpingitis. Macroscopically the tubes may be free and non-adherent, or merely sticky with fresh lymph; they are swollen and congested and the fimbriæ are turgid and angry, and infective purulent matter may leak from the abdominal ostium. There is always a hypersecretion of mucus, the formation of pus and a loss of some of the lining epithelium. The muscular and peritoneal coats become edematous. The fimbriated extremity is swollen and is usually quickly closed, either by inversion of its peritoneal covering and adhesion of the serosal surfaces of the fimbria, or by pouting of the mucosa, which allows leakage and produces adhesions between the tube and ovary, or the tube and adjacent bowel, or with the pelvic peritoneum.

The weight of the inflamed tube causes it to be displaced downward, which results in distortion and adhesion to the back of the uterus or in the cul-de-sac of Douglas.

Microscopical Changes in Endosalpingitis.—On microscopical examination the stroma of the plica is found to be swollen, edematous and infiltrated with small, round cells—polymorphonuclear leukocytes and plasma cells—while the lining surface epithelium is proliferated, swollen and in many cases desquamated from the stroma.

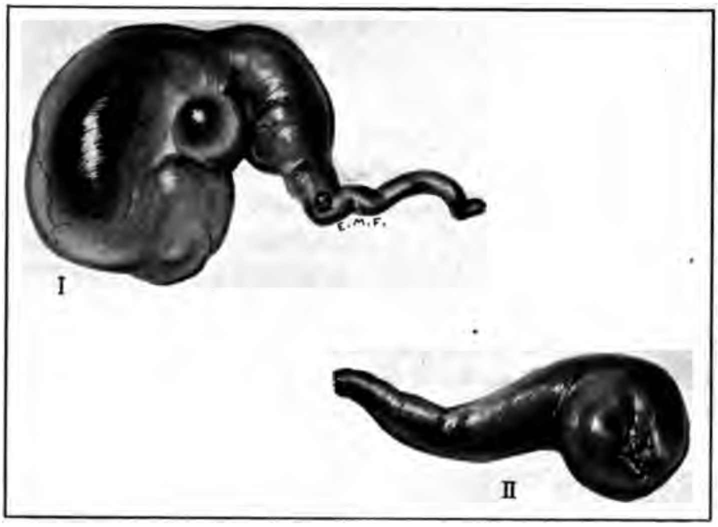


FIG. 118.—*I*, pyosalpinx; *II*, hydrosalpinx, showing adhesion of the inverted fimbriæ.

The muscle and fibrous tissue of the tubal wall are infiltrated with leukocytes, and the lumen filled with pus and mucopus.

Perisalpingitis.—Infection extending downward from the peritoneum or through the parametrium usually affects the outer surface of the tubes, producing a perisalpingitis. The serosa becomes congested and adhesive—the endothelial cells of the peritoneum loose their glistening appearance, exudate is thrown out and adhesions form between the tube, ovary, parietal-peritoneum and adjacent intestinal coils, forming a conglomerate mass to the back and sides of the uterus. The abdominal ostium being more or less completely closed by the exudate and adhesions. The nearby pelvic structures are often involved in the infection, especially the ovary and secondary pus collections may form in the pelvic peritoneum. *Most chronic pelvic inflammations originate from purulent salpingitis;* for the purulent leakage excites a peritoneal reaction with the formation of inflammatory exudate and infiltration; the condition never becomes quiescent unless the abdominal ostium is completely sealed.

The termination of acute salpingitis depends largely on the nature of the infecting coccus; it may terminate in resolution, or cystic salpingitis, or hydrosalpinx, or hematosalpinx, or pyosalpinx.

Hydrosalpinx.—Hydrosalpinx is a thin walled translucent, retort-shaped distention of the tube, due to a serous accumulation arising from a catarrhal or a more severe type of salpingitis, frequently from perisalpingitis, resulting from parametrial extension. *The outer end of the tube is closed,* the uterine end may or may not be patent, if the former, the intratubal pressure is such as to make it relatively impatent. Some hydrosalpinges represent the terminal stage of a pyosalpinx.

Hematosalpinx.—Hematosalpinx is a distention of the tube, by an accumulation of blood. The abdominal end of the tube is closed, and the uterine end usually stenosed. The walls are thicker than in hydrosalpinx. It results from hemorrhagic salpingitis or most frequently from tubal pregnancy. A hemotasalpinx may discharge into the uterus, or may wholly or partially disappear by absorption; or a pyosalpinx may follow from pyogenic infection.

Pyosalpinx.—Pyosalpinx is a distention of the tube by a purulent accumulation. The tube wall may be quite thin when it is simply distended or thickened, sometimes greatly so, when it has been invaded by the septic process. The abdominal end is usually closed. Its size may reach that of the first. The distended tube usually becomes adherent in the peritoneal cul-de-sac, and to the posterior surface of the uterus and broad ligaments, or to the ovary, omentum and intestines. The appendix is adherent in the pelvis, in from 10 to 15 per cent of cases, hence the difficulty in making a differential diagnosis in right-sided inflammation.

Tubo-ovarian Abscess.—The fimbriæ of the infected tube may become adherent to a ruptured Graafian follicle and infect the ovary, or if an ovarian abscess lies in apposition to the distended outer extremity of a pyosalpinx the septum between them may break down and the collection of purulent material merge, forming a tubo-ovarian abscess. Such accumulations may attain a large size and fill the cul-de-sac with a fluctuant mass.

General peritonitis may result from septic pus tubes; on the other hand, gonorrheal infections tends to remain localized. The tube may become adherent and rupture into the peritoneum, or into the adjacent viscera. *Rupture into the peritoneum is always attended with signs of an intra-abdominal calamity.* Encysted pus collections may form within the peritoneum between the omentum, uterus and sigmoid.

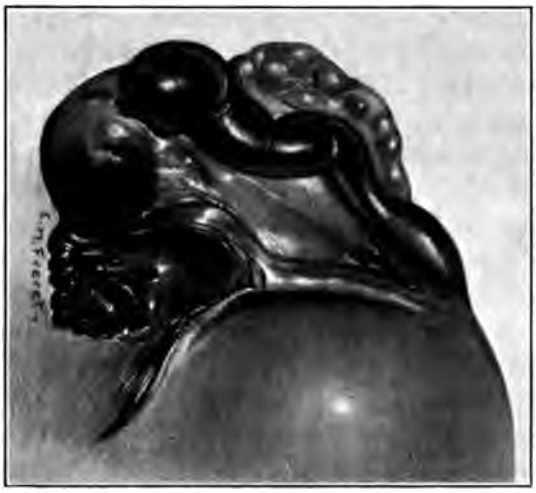


FIG. 119.—Pyosalpinx. Salpingitis. Isthmica nodosa.

In chronic cases frequently (60 per cent) the bacteria are dead and the pus is sterile.

Symptoms —*In acute cases it is difficult to disassociate the symptoms of salpingitis from those of acute endometritis or peritonitis accompanying the tubal infection.* The antecedent *history of urethritis is significant of gonorrhea, as is the history of labor or abortion of sepsis.* Often the systemic disturbance is marked at the onset by a rise of pulse and temperature in proportion to the virulence of the local process. *Frequently symptoms of general pelvic inflammation make an anatomical diagnosis impossible.*

As the acute process subsides *there is always a mucopurulent leucorrhea,* accompanied with pain and tenderness in the region of the affected tube most marked when the peritoneum or ovary is inflamed. The pain is often intermittent or colicky; associated with lumbar backache and often with dysuria or dyschezia depending on the location of the purulent mass. *Menstruation is disturbed,* the bleeding being too frequent or too profuse and attended with *premenstrual* and *menstrual* pain. *In chronic cases,* sterility, tympany, pressure symptoms, vesical and rectal tenesmus help to make up the symptom-complex.

All symptoms are aggravated by standing or walking.

Recurrent attacks of pelvic peritonitis are characteristic and occur most frequently at the menstrual periods. These exacerbations are comparatively common in the early stages of chronic salpingitis and are explained by leakage of the tube content through an incompletely closed abdominal ostium.

General debility, loss of weight, digestive and nervous disturbances result from the continued local pain, infection and general discomfort.

Dysmenorrhea and intermenstrual pain are the principal symptoms. The pelvic pain usually subsides when the flow has become established.

The symptoms are not necessarily marked in chronic infection of the tubes. Time effects a symptomatic cure in some cases.

Physical Signs.—On abdominovaginal and abdominorectal examination the tube is usually found thickened and tender and at the side and frequently behind, rarely in front of the uterus. It is generally fixed. There is pain on moving the uterus, owing to the pelvic peritonitis and uterosacral cellulitis, always associated with tubal inflammation.

The tube and ovary and often other pelvic contents are so matted together into a pelvic mass that an anatomical diagnosis is impossible.

In tuberculous salpingitis there is usually evidence of tuberculosis in other organs, or tubercle bacilli may be found in the uterine discharge.

Differentiation from appendicitis, etc., is made on the history and physical signs. Appendicitis usually presents a *symptom* *sequence*, *i. e.*, acute abdominal pain, vomiting, localized tenderness, temperature and leukocytosis.

The location of tenderness in appendicitis is at McBurney's point, on a line between the umbilicus and the antero-superior spine of the ilium, one-third of the way from the right spine.

Pressure with the hand over the colon, forcing the cecal contents toward the appendix; *causes pain in appendicitis;* this aids in distinguishing it also from disease of the kidney and ureter. *Tenderness at Morris' point*, which is located one and a half inches to the right and below the umbilicus, is also suggestive of appendicitis.

While sensitiveness at Hoenk's point, situated one and a half inches to the right and above the umbilicus, is found in most cases of appendicitis.

There is less rigidity of the recti in salpingitis than is found in appendicitis.

Examination while the patient lies on the left side helps in detecting tenderness at McBurney's point. *There is no tenderness at the latter point in salpingitis.*

The gall-bladder follows the movements of the diaphragm, disease in this organ gives characteristic symptoms and physical signs.

Nephrolithiasis may be excluded by examination of the urine, catheterization of the ureters and by roentgen-ray examination.

Physical Signs of Pyosalpinx.—The tube forms a tumor varying in size from that of a finger to that of a fist. It is situated behind, beside, but rarely in front of the uterus. It may be sausage-shaped and lying in the cul-de-sac and may fluctuate or be apparently as dense as a fibroid, or the pelvis may be partly or wholly fixed with a hard board-like mass owing to the diffuse peritubal exudate. The uterus is enlarged, more or less firmly fixed, displaced, and the tube may be indistinguishable from the general mass. The omentum and intestines are often adherent to the mass. Bimanual examination under an anesthetic will usually demonstrate that the tubal or tubo-ovarian enlargement is distinct from the uterus.

Palpation and percussion over the abdomen are useful in detecting and mapping out the tumor when not too small.

Differential Diagnosis of Pyosalpinx.—A pyosalpinx must be distinguished from an appendicular abscess, a parametritic abscess, or a small ovarian tumor; the latter is generally more nearly globular and not so closely connected with the uterus. Large ovarian tumors are recognized by their size, position, contour and consistency. Tubal pregnancy by its history; *fecal tumors by the effect of cathartics and enemata;* neoplasms of the tube or broad ligament and hematoma from ruptured tubal pregnancy by the history.

In hydrosalpinx; pain, tenderness and systemic disturbances are less marked than in pyosalpinx. The walls are thin and more fluctuant.

Hematosalpinx is distinguished *by the more abrupt development* and the history of tubal pregnancy.

The tumor is less elastic than a hydrosalpinx and systemic disturbances may be more marked than in a hydrosalpinx.

In acute inflammatory conditions satisfactory examination is often impossible without anesthesia.

Definite differential diagnosis is not always possible.

Prognosis.—Resolution frequently occurs in the catarrhal form and even in the gonorrheal form regeneration of the tube is possible or hydrosalpinx or hematosalpinx may result. Purulent salpingitis commonly terminates in pyosalpinx. Recurrent attacks of pelvic peritonitis are common. *Streptococcic salpingitis is dangerous to life.* The general tendency of acute pelvic inflammation is to subside and localize the infection within the pelvis, when properly treated there is however, always a resultant pathology.

Rupture may take place into the peritoneum, the bladder, rectum, or on the skin or vaginal surfaces with resulting permanent fistulæ. In such cases, generally, relief is only temporary. Intestinal or ureteral obstruction may occur.

Sterility and chronic invalidism are the rule.

Tuberculous infection may extend to the peritoneum or may become generalized. Spontaneous recovery is possible as in other forms of tuberculosis.

The operative prognosis in septic or gonorrheal cases, *after all acute symptoms have subsided,* is good; the mortality not exceeding 2 per cent.

Treatment.—*There is no operative treatment for acute pelvic infection* unless a local abscess has formed. *The treatment of salpingitis* in the acute stage consists of rest in bed, with hot fomentations or the cold coil over the lower abdomen; postural drainage (Fowler position); enemata and the administration of some form of opium for the pain. Time does much toward allowing the pelvic organs to assume their normal functions.

After the acute stage, hot vaginal douches at 120° F., for ten or fifteen minutes, twice daily and tincture of iodine to the vaginal fornix every two days, followed by boroglyceride or ichthyol tampons, favor the absorption of the peritoneal exudate.

If an abscess forms, evacuation may be done by posterior vaginal section. *Operative intervention by the abdominal route is generally contraindicated during the early stage,* except in diffuse peritonitis, when incision and drainage may be considered.

Chronic Form.—In chronic salpingitis, with few or no adhesions, no pelvic abscesses or other gross lesions, conservative methods do much toward restoring the functions of the pelvic organs. With extensive or painful adhesions and with displacement, vaginal or abdominal section is usually required.

For pyosalpinx, hematosalpinx, or hydrosalpinx, generally salpingectomy or salpingo-oöphorectomy is indicated; sometimes hysterectomy will be necessary, especially if the patient is past middle life.

In double salpingectomy the uterus should also be removed if incurably diseased, or if it is much damaged at operation.

In salpingectomy for tuberculous salpingitis, hysterectomy should also be done if the uterus is tuberculous.

No abdominal operation should be done in subacute or chronic pelvic inflammation until the leukocyte count is less than 11,000 and the rectal temperature has been normal night and morning for a period of ten days.

Methods of Operation in Sactosalpinx.—*Anterior Vaginal Section.*—A longitudinal incision in the mucosa of the anterior vaginal wall and separation of the bladder from the front of the uterus, allows adhesions of the tubes and ovaries to be broken up, and the fundus and appendages of one side to be delivered through the incision into the vagina.

In conservative operations the abdominal end of the tube is opened and the tubal mucosa turned back upon the perisalpinx, or so much of the tube as is desired should be removed.

The diseased portion of ovary may be exsected and the wound in the ovary closed by fine catgut sutures.

The entire tube or ovary, or both, are removed only when wholly unsound.

The appendages are then returned and those on the opposite side drawn down, examined, treated and replaced.

The peritoneal and vaginal wounds are closed and a rubber-tissue drain may be left for one or two days between the uterus and bladder.

Posterior vaginal section or incision in the cul-de-sac of Douglas is especially adapted to evacuation of acute pus tubes. The uterus is drawn down and the mucosa at the uterovaginal junction incised transversely; the peritoneum is opened with the finger and a free opening made in the tube; with scissors guided by the finger the pelvic cavity is explored for secondary pus sockets. These should be evacuated and the cul-de-sac filled with drains of twisted, washed-out iodoform gauze.

The pack may be replaced by a soft-rubber tube in five to eight days.

The patient is placed in the Fowler position to favor gravity drainage.

Free drainage must be maintained until all discharge ceases. Subsequent laparotomy or anterior vaginal section may sometimes be required.

Abdominal Section.—Either a conservative or radical operation is usually best done through the abdomen. After-pain, shock and risk of sepsis are little greater and the ultimate results are generally better. *The exception is in the presence of acute infection.*

Technic.—An incision is made above the symphysis, near the inner border of one rectus muscle. The tube and ovary are freed from adhesions and lifted out of the abdomen, and the ovarian vessels ligated by No. 2 catgut ligature passed through the ovario-pelvic ligament. The ascending uterine artery and vein being tied in continuity or by their isolated ends. The tubes are cut away from the broad ligaments and dissected out from the uterine cornua; the ligaments and uterine wounds are closed with a running suture.

Occasionally the healthy portion of the tube, if any remains, may be implanted in the uterine cornu—hysterosalpingostomy.

The ovaries are not removed if sound. The operation is completed as in other laparotomies.

Drainage, if required, should be made through the posterior vaginal wall.

In double pyosalpinx hysterosalpingectomy should be elected, if the uterus is large or has suffered much traumatism.

OTHER AFFECTIONS OF THE UTERINE TUBES.

Actinomycosis of the Fallopian tubes is extremely rare. The diagnosis can only be made by finding the corpora flava or by injecting the pus into animals and producing an actinomycotic lesion.

Adenoma, myoma, fibroma, lipoma, carcinoma, sarcoma and *dermoid cysts of the Fallopian tubes* are sometimes observed, while *syphilitic gumma* are occasionally met with.

Hydatids of Morgagni.—Small cysts, 1.5 cm. or less in diameter, are generally found attached to the fimbriated end of tne Fallopian tube. They represent the remains of Gärtner's duct. Small cysts may be considered normal. Exceptionally a cyst may grow to pathological dimensions, become torsioned and occasion acute symptoms.

ACCIDENTS WHICH MAY COMPLICATE TUBAL ENLARGEMENTS.

Rupture.—A pyosalpinx or hydrosalpinx may rupture. The accident is rare and has usually followed trauma—such as rough bimanual examination while the patient is anesthetized, coitus or straining at stool—when the tubal tumor is low and adherent in the cul-de-sac.

Symptoms.—The symptoms are those of an abdominal calamity, acute agonizing pain in the lower abdomen, attended by shock and followed by the signs of acute peritonitis.

Treatment.—The treatment consists of immediate operation, removal of the tube and drainage.

Torsion.—Torsion of a tubal enlargement is a rare complication and has occurred more frequently in hydrosalpinx, as this form of tubal distention, with its undistended isthmus and retort-shaped terminal portion is more mobile—and likely to be found out of the true pelvis and thus come in contact with intestinal coils.

Symptoms.—The symptoms resemble those of ovarian cyst with twisted pedicle—sudden agonizing pain, shock and increased pulse-rate.

Diagnosis.—The differential diagnosis between this and cyst is quite impossible until the abdomen is opened.

CHAPTER XIII.

ECTOPIC GESTATION.

Extrauterine pregnancy is a pregnancy which occurs outside of the uterine cavity.

Ectopic pregnancy occurs more frequently than available statistics would indicate, *i. e.*, it has been estimated that it occurs once in 1200 pregnancies, which is believed to be too low an estimate, as it has been found that with the better diagnostic methods of recognizing them, the proportion of ectopics has increased.

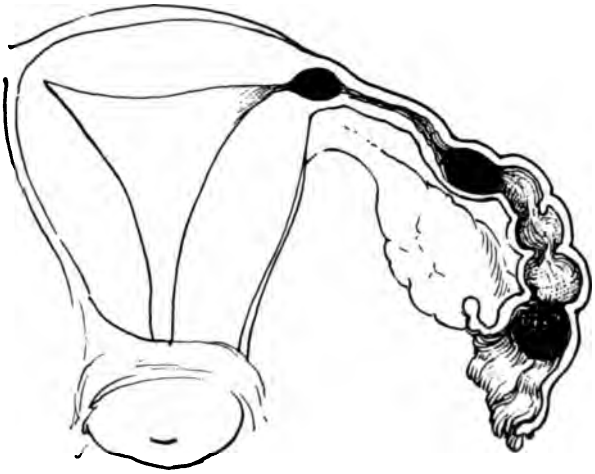


Fig. 120.—The three most frequent locations for the arrest of the fecundated ovum in its transit through the tube.

Classification.—The classification of extrauterine pregnancy is based upon the situation of the developing ovum.

1. *Tubal.*—Nearly all ectopic pregnancies are primarily tubal. In tubal pregnancy the impregnated ovum lodges and begins its development in the Fallopian tube at the point of arrest. The ovum may be arrested in transit toward the uterus, in the *ampulla* (76 per

cent) by the neck of the tube; in the *isthmic portion* (21 per cent); or in the *interstitial or intramural portion* (3 per cent) of the tube.

2. *Ovarian Pregnancy.*—In an ovarian pregnancy the ovum is impregnated in the Graafian follicle and the gestation develops within the substance of the ovary.

3. *Abdominal Pregnancy.*—In primary abdominal pregnancy the ovum imbeds itself in the peritoneum.

The existence of a primary implantation of the ovum upon the peritoneum has not yet been satisfactorily proved. In the majority of the reported cases the ovum has had a tubal attachment and has derived its circulation from this source.

Etiology —All conditions which interfere with the transit of the ovum from the ovary to the uterus, and allow it to develop to a size that interrupts its passage, may be considered as causes of extra-uterine gestation.

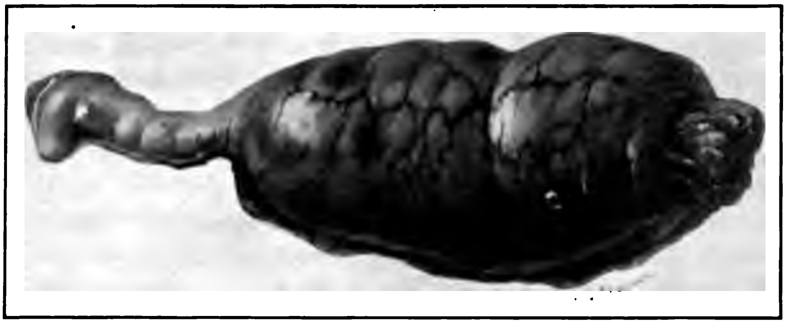


FIG. 121.—An unruptured tubal pregnancy in the free portion of the tube.

Among the conditions which may interfere with the motility of the ovum are chronic salpingitis and perisalpingitis; congenital anomalies in length or excessive convolutions, endosalpingitis producing strictures and diverticula by adhesion of neighboring plica, crippling the propelling power; peritoneal adhesions and adjacent tumors producing atresia. The majority of the writer's cases have had a history of previous pelvic inflammatory disease.

An ovule may become implanted and develop in the *ampulla or free portion* of the tube, or in the *isthmic or intraligamentous* portion, or in the *interstitial* or *tubouterine portion of the tube*, with any of the following terminations:

(*a*) An ovum which develops in the *ampulla* may die, and become absorbed, or form a tubal mole, or *the ovum may be expelled through the abdominal ostium* into the peritoneal cavity, as a *tubal abortion; 76 per cent of all ectopics terminate in this manner.* If the *abortion is complete the hemorrhage is usually limited.* In complete abortion—and tubal abortion is incomplete in the majority of cases—free (intraperitoneal) hemorrhage may occur. On the other hand the embryo with its membranous envelope may be extruded from the tube into the abdominal cavity, retaining its tubal attachment, in which case the bleeding may be slight and the pregnancy continue as a secondary abdominal gestation, under these circumstances the membranous envelope is expelled into the peritoneal cavity and the placenta retains, in great part, at least, its tubal attachment, which becomes its source of nourishment or a pregnancy in the outer portion of the tube may become tubo-ovarian or tuboabdominal by adhesions of the *fimbriæ to the ovary* or to the *parietal peritoneum.*

Primary rupture of the tube almost always takes place before the eighth week. *Primary rupture is seldom fatal, although death may occur from the initial hemorrhage,* or the hemorrhage may cease spontaneously, and the ovum and blood-clots may be absorbed.

(*b*) *The developing ovum may be arrested in the isthmic portion of the tube,* and the pregnancy terminate by death of the ovum, or the formation of a hematosalpinx, a pyosalpinx, or a mole; or *it may develop and rupture into the peritoneal cavity with serious hemorrhage, or rupture into the broad ligament* and (1) become an *intraligamentous pregnancy* and continue to grow, the placenta remaining attached to its tubal bed. This form of ectopic gestation may go to term and be considered an abdominal pregnancy. *Should the fetus live and go to term, spurious labor may occur; and end in fetal death, unless the condition is diagnosticated and the child is promptly delivered by abdominal section;* (2) the ovum may rupture into the broad ligament and die and form a hematoma between the folds of the ligament; (3) the ovum may die and suppurate, and be cast off piecemeal through the abdominal wall, the vagina, the bladder, the rectum, and result in septicemia and death; (4) the ovum may develop until the later months, then die, and be carried indefinitely with little or no alteration of structure or constitutional disturbance or it may be converted into a lithopedion or a mass of adipocere; on the other hand an ovum which has ruptured into the broad ligament may live and grow until secondary rupture takes place into the peritoneal cavity attended with serious shock and hemorrhage. *Secondary rupture is usually fatal to the fetus and the danger to the mother is very great.* Rarely the fetus may survive as an abdominal pregnancy.

(*c*) *An arrest of the ovum in the interstitial portion of the tube may terminate*:

1. By death of the ovum.

2. By expulsion of the ovum into the uterus, in which case the pregnancy may terminate as an abortion or proceed and develop as an intrauterine pregnancy.

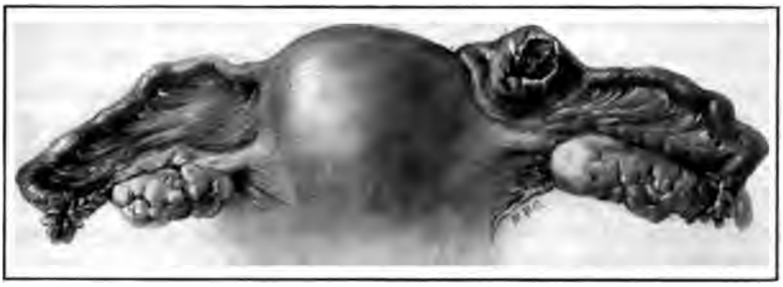


FIG. 122.—Drawing from a fatal case of ruptured isthmic interstitial pregnancy. Death from hemorrhage at primary rupture. (Author's collection.)

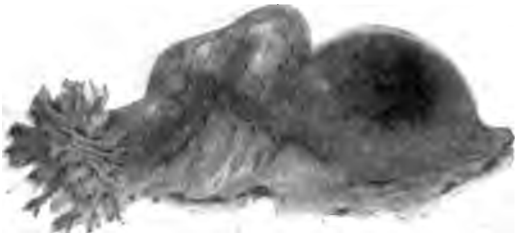
3. By rupture into the peritoneal cavity, with death of the mother from hemorrhage and shock. The woman rarely survives interstitial rupture unless the hemorrhage is checked by prompt surgical intervention.

4. The ovum may rupture into the broad ligament, when it has the same possibilities as have already been described under isthmic rupture into the ligaments.

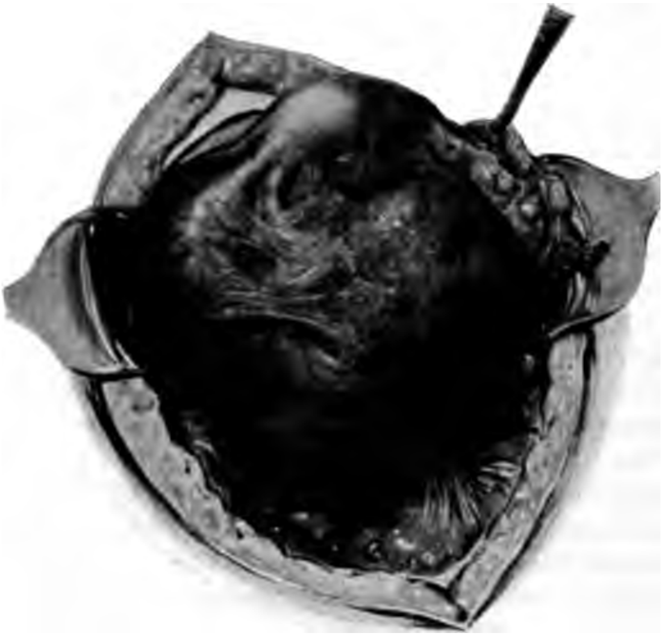
Interstitial or tubouterine pregnancy generally terminates by rupture before the sixth month.

Termination of Ovarian Pregnancy.—(*a*) The ovum may be arrested in its development during the early weeks and produce a cystic tumor of the ovary; (*b*) or it may grow and break out of the containing sac—the rupture being attended with profuse hemorrhage.

PLATE IX



Unruptured Tubal Pregnancy in the Isthmic Portion of the Tube. (Döderlein.)



Isthmic Tubal Pregnancy (Right) Ruptured into the Broad Ligament—Hematoma.

Pathology.—*The Pathological Course of Tubal Pregnancy.*—The pathology and symptoms in tubal pregnancy are due to the fact that there is no definitely developed decidua in the tube similar to the thick intrauterine decidua in normal pregnancy—to protect the tube wall from the erosive action of the trophoblastic cells. *The decidual reaction in the tube is thin, scattered and not protective.* The impregnated ovum imbeds itself at the point of arrest, either in the plications of the tubal mucosa or directly in the muscular tissue of the tubal walls. The muscle cells are thus destroyed by the eroding action of the trophoblast and the site of the ovum actually becomes intramuscular. The trophoblast also invades the small venous radicals in the uterine walls; this leads to hemorrhage into the decidua, partially separating the ovum from its bed and overstretching the tube—in fact, the distention may be so great as to produce a porosity of the tube walls and *allow the blood to extravasate through the stretched and porous muscularis and serosa,* or into the lumen of the tube compressing the embryonal sac and escaping from the fimbriated extremity into the cul-de-sac, forming a hematocele.

This explains the presence of blood in the peritoneal cavity before actual rupture has occurred.

The primary rupture is a gradual erosive process, due to the penetration by the cells of the villi, extending through the tube wall to the serous covering, and weakening it until the tube gradually gives way under the pressure of the growing ovum.

The decidual formation in the tube is imperfect. It occurs only in patches on the tubal mucous membrane, *while within the uterus a more or less complete decidua is developed, which is cast off with the death of the ovum.*

Diagnosis.—A diagnosis of ectopic pregnancy is possible before rupture in a large majority of cases, if proper consideration is given to the *history and physical findings.*

Before Rupture—History.—Ectopic pregnancy is often preceded by a period of sterility. This is usually present in the woman who has been the subject of a chronic inflammatory lesion in the pelvis, or presents congenital anomalies of the pelvic organs, on the other hand there may be no history of any pelvic lesion.

There is usually a period of *amenorrhea, together with the other symptoms of early pregnancy,* as nausea or some of the breast signs.

The normal menstrual period may not be skipped, but be *postponed* or *prolonged,* or *anomalous* in character. Frequently before primary rupture there are sharp, knife-like pains running through the pelvis, or there is a sensation of soreness and discomfort in the lower quadrants of the abdomen which have caused the woman to seek medical advice, or painful defecation may be the only objective symptom complained of.

The Uterus.—The *cervix may be softened and have a dusky hue and the uterus may be enlarged and displaced forward or to one side of the pelvis,* according to the size and situation of the growing fruit sac. The cervix is open and *exquisitely sensitive to motion owing to the peritoneal reaction caused by free blood in the cul-de-sac and sensitive uterosacral ligaments; the uterine cavity is empty.*

The Tumor.— The growing ovum is found beside, or behind, or in front of the uterus, displacing it. The characteristics of the tumor are that *it is tense, fluid, tender, pulsating and rapidly growing.*

A careful pelvic examination should be made in every woman presenting an anomalous menstrual history. If the pelvic findings are suggestive of ectopic gestation, she should be kept in bed under observation until a positive diagnosis can be made or excluded by the progressive physical findings.

A patient suspected of having an ectopic pregnancy should never be examined under anesthesia.

The Cardinal Symptoms of Early Ectopic Pregnancy.—1. *A missed menstruation or an anomalous menstruation.*

2. *A sudden onset of abdominal pain, referred to one or the other side of the pelvis, or to the epigastrium.*

3. *A bloody vaginal discharge.*

4. *The cervix sensitive to the slightest motion.*

5. *A tender mass beside or behind the uterus, displacing it.*

6. *A slight elevation of temperature—usually not greater than* 100.4° F.

7. *A leukocytosis of 15,000 or more.*

8. *Repeated exacerbations of pain and enlargement of the pelvic mass while the patient is under observation with no corresponding elevation of temperature.*

Diagnostic Signs of an Intraligamentous or Abdominal Pregnancy in the Later Months.—1. A history of pregnancy.

2. Mammary signs of pregnancy.

3. An abdominal tumor of pelvic origin.

4. Active fetal movements, which are usually more distinct than in uterogestation.

5. The fetal parts are more accessible to palpation.

6. The fetal heart tones are more intense than when the fetus is within the uterus.

7. Ballottment is obtainable in the fourth and fifth months.

8. The uterus is enlarged, but not proportionately to the period of gestation and is displaced upward, forward and to one side, and can be differentiated from the fetal tumor.

The most reliable diagnostic point in the later months is evidence of an existing pregnancy, *with a uterus which is normal or little developed, and distinguishable from the tumor mass. Shrinkage of the tumor generally follows upon the death of the fetus.*

Signs of Tubal Abortion or Primary Rupture.—1. *Metrorrhagia.—Special significance should be given to the history of a postponed, skipped, prolonged or anomalous menstruation, which is followed by metrorrhagia, irregular in occurrence and in amount.* The bleeding is especially observed at or about the time of the painful paroxysms. *The bleeding may be more or less profuse, or be only a persistent spotting of a reddish-brown discharge, mixed with mucus which does not clot.*

2. *Pain.*—The pain occurs in abrupt paroxysms and is referred to the pelvis or lower abdomen. There are *colicky exacerbations and intervals free from suffering.* The paroxysms usually appear from a few days to several months after a normal or anomalous menstruation.

3. *An irregular genital hemorrhage* usually follows or occurs with the attack of pain. In some cases the irregular bleeding begins with the conception, and is only more profuse at the time of abortion or rupture.

4. Symptoms of acute internal hemorrhage, with faintness and more or less collapse may be present at the time of the painful paroxysms. The pulse is rapid, the blood-pressure is low. The face is pallid and a cold sweat appears about the mouth and forehead.

5. The rectal temperature may be subnormal just after rupture, but is generally slightly elevated, 100° to 100.4° F.

6. A decidual cast is expelled from the uterus, either as a complete cast of the uterus or in shreads with the genital discharge.

7. There are abdominal tension and tenderness over the region of the fruit sac, usually in one or the other iliac fossa; later there is evidence of peritoneal irritation in the lower quadrants of the abdomen.

8. On pelvic examination the physical signs of hematoma or hematocele may be found. *In the former the uterus is displaced upward and to one side by the mass in the broad ligament, while in the latter the uterus is fixed and pushed forward and upward or downward by a sensitive, boggy and ill-defined mass in the cul-de-sac. Both masses increase in size if the hemorrhage does not cease spontaneously. Aspiration through the vagina will definitely determine the character of the contents.*

9. *Movement of the cervix almost always causes exquisite pain, due to the peritoneal irritation.* The blood will show a moderate leukocytosis, a diminution in the percentage of the hemoglobin, and a rapid reduction in the number of red cells. The last two changes are progressive if the internal bleeding continues.

In tubal abortion or rupture with serious hemorrhage the clinical picture is unmistakable. The majority of cases are typical, but we must ever be on our guard for the atypical ectopic. *Persistent metrorrhagia after a skipped or anomalous menstruation, associated with sharp attacks of abdominal pain, should always suggest the possibility of an ectopic.*

Treatment.—1. *Before Rupture.*—Once the diagnosis is made, the abdomen should be immediately opened and the pregnancy terminated by incision along the dorsum of the tube and evacuation of its contents, or by the removal of the affected tube.

2. *After Rupture.*—The *immediate indication is to combat the shock and control the hemorrhage.*

Should the patient be seen in collapse, she should at once be placed in an exaggerated Trendlenburg posture by raising the foot of the bed twenty-four to thirty-six inches, and given morphine sulphate grain $\frac{1}{3}$ hypodermically. *All stimulants must be withheld. The pulse and blood-pressure should be taken every hour and recorded.* If the pulse becomes slower and stronger, and the blood-pressure gradually rises to 100 mm., *operation should be deferred for* *at least twenty-four hours to allow reaction to take place.* The use of a saline solution by the rectum, administered by the drop method (Murphy drip), contributes a fluid content to the empty vessels. If, on the other hand, under the above treatment, the pulse rises and become more rapid and the symptoms of internal hemorrhage increase, *an immediate celiotomy should be done.*

In an experience of 327 consecutive ectopics, the writer has done but one immediate operation, with a mortality of 2.1 per cent.

Technic of Operation for Ectopic Pregnancy.—*The Preoperative skin preparation* should be made on the table; no cathartics or enemata are necessary. The abdomen is rapidly opened and the hand passed at once to the region of the fruit sac, which is lifted out of the abdomen; and a clamp is placed on the broad ligament, including the tube near the cornua of the uterus, while another is placed on the ovario-pelvic ligament beyond the free end of the tube. Compression at these points controls the utero-ovarian anastomosis and checks all hemorrhage. The field is partly cleared of blood; the tube and fruit sac drawn up, and cut away between the clamps. The ovarian vessels are tied with fine catgut between the folds of the ligament and the two peritoneal layers of the ligament whipped together with a running suture of catgut.

The blood and blood-clots in the peritoneum are removed with the hand and with large gauze sponges. *A detailed search of the peritoneal sac for clots is unnecessary,* and only prolongs the operation. A quart or a quart and a half of normal salt solution, at a temperature of 105° F. may be left in the peritoneal sac; this not only dissolves many of the overlooked clots, but will help to refill the empty vessels.

When the patient has suffered much blood loss and the pulse is feeble and rapid, no time should be lost in the peritoneal toilet. Little or no harm is done in leaving some blood in the peritoneum. The abdomen is closed by the quickest method, with cross-sutures of silkworm gut. In septic conditions drainage may be practised by the vagina. The anesthetic should be discontinued when the peritoneum is closed, a hypodermic of morphine sulphate grain ¼ supplying the necessary analgesia. One quart of saline may be injected into the rectum, sigmoid and colon, while the patient is still in the Trendelenburg position, or a pint of saline may be injected behind each breast. Saline is very rapidly taken up from the colon and cellular tissue. *Direct infusion into the vein is apt to cause cardiac dilatation and pulmonary edema.*

Direct transfusion of blood has in ectopics, with extreme anemia and collapse, one of its greatest fields of usefulness.

Treatment After Rupture into the Broad Ligament.—*In the first three months* limited effusions of blood do not usually require surgical intervention. Should the blood collection become septic, the sac may be opened and drained through the vagina.

In large blood collections it is well to make an exploratory abdominal section to observe the limits of the effusion, but when possible, *the drainage should be extraperitoneal or from below.*

If the ovum survives the rupture of the tube into the broad ligament *it should be treated as a malignant growth by celiotomy.* Ligation of the utero-ovarian anastomosis, and extirpation of the fruit sac. *In extrauterine pregnancy the life of the child is of too little value to weigh against the interests of the mother.*

After the third month, while the fetus is extraperitoneal, celiotomy and removal, if possible, of the entire ovum are indicated once the diagnosis is established. When the fetus has been dead for two or three months the placental vessels will be found obliterated, and the complete extirpation of the sac generally is possible. Cutting off the utero-ovarian anastomosis by ligation of the broad ligament on either side of the fruit sac usually controls the hemorrhage. The oozing which generally follows the removal of the placenta may be taken care of by firmly packing the bleeding cavity with gauze, the ends of which may be carried into the vagina.

In the later months, if the fetus is living, it is not always advisable to attempt the removal of the placenta, as the bleeding is sometimes appalling. Beck's studies have shown that where the placenta has a broad attachment, the cord should be cut and tied and the placenta left *in situ* undisturbed. The abdomen closed without drainage, or the fetal sac may be stitched to the abdominal wall, and its cavity packed firmly with washed iodoform gauze, and the placenta left to separate, which usually occurs within a week or ten days. The recovery, however, is tedious and attended with more or less septic absorption. It may be possible to remove the larger portion of the sac by tying the arteries on both sides and ligating the base in sections with mattress sutures.

Treatment of Secondary Rupture.—After secondary rupture into the peritoneum, the treatment is the same as has already been described in primary intraperitoneal rupture.

Treatment of Interstitial Pregnancy.—When the diagnosis is possible before rupture, the pregnancy may sometimes be terminated safely by emptying the fruit sac through the uterine cavity. This is considered, however, a hazardous undertaking, and it is preferable to make an abdominal section and excise the cornu of the uterus, including the tube and ovum, or remove the uterus with the contained interstitial pregnancy.

CHAPTER XIV.

PERITONITIS, CELLULITIS, HEMATOCELE.

PELVIC PERITONITIS.

Pelvic peritonitis is an inflammation of the pelvic peritoneum which is usually the result of an extension of infection from the uterus through the tubes, or from the deposit of infectious organisms in the pelvic cavity during operations.

Its cause may be septic, gonorrheal, or tuberculous infection.

It is commonly secondary to infections of the uterus, tubes, bladder, pelvic cellular tissue, intestines or the appendix vermiformis. Occasionally it is due to septic infection following abdominal section, for after every operation on the pelvis there is more or less inflammatory reaction in the traumatized tissues and when infection is added to trauma the peritoneum throws out an exudate, which is either protective or purulent. *Septic and gonorrheal infections nearly always proceed from the tubes.*

Symptoms and Signs.—In the acute form the disease may be ushered in with a chill or chilliness, intense pelvic pain and tenderness, high pulse, temperature, leukocytosis, tympanites, irritability of the bladder and dysmenorrhea. On examination there is fixity of the pelvic organs, rigidity of the recti muscles, retraction of the thighs, tympany, nausea and vomiting, and usually obstinate constipation.

In chronic cases there may be little fever, pain or tenderness, except abdominal soreness preceding the menstrual epoch.

The pelvic viscera, however, are fixed and matted together by adhesions; and sometimes encysted serous or purulent collections are found in Douglas' pouch.

In tuberculous peritonitis the infection usually comes from the tubes. Four varieties have been described by Murphy: (1) The ascitic or serous; (2) the adhesive; (3) the nodular or ulcerative; (4) the suppurative.

In tuberculous peritonitis the onset is gradual or may appear suddenly, the pain and tenderness are less intense and more diffuse; diarrhea is not uncommon. The temperature ranges from 99° to 104° F., or may be subnormal in the morning in chronic cases.

The general health is always considerably disturbed, menstruation may or may not be affected.

The abdomen enlarges and commonly presents a sense of tension disproportionate to the tenderness.

Urination is frequent and painful, the patient complaining of a sense of fullness in the abdomen. The liver and spleen are usually enlarged.

The peritoneum when exposed is found studded with tubercles; the intestines and pelvic viscera may be matted together and cheesy material may be seen escaping from the tube; the mesenteric glands are enlarged.

Certain symptoms are common to all forms of peritonitis, differing only in their intensity and location, *i. e.*, *tenderness*, *rigidity*, *abdominal sensitiveness*, *tympany*, *intestinal paresis*, and *gastric irritation.*

Prognosis.—The prognosis depends on the virulence of the infection, the tissue resistance and location of the viscera involved. The possible results of peritonitis are resolution with complete or partial symptomatic and anatomical cure; peritoneal and visceral adhesions; encysted serous effusions; pelvic abscess, and diffuse peritonitis.

Treatment.—The treatment in *acute septic cases is rest in bed, in the Fowler position,* an ice-bag or hot fomentations to the lower abdomen, enemata to empty the rectum and pelvic colon and sufficient opium to limit the peristalsis, together with tonics, alcoholic stimulants and general supporting measures.

In diffuse peritonitis, a *median abdominal section* under gas and novocain, *with drainage* through the lower angle of the wound or by posterior vaginal incision or by both routes. *The Fowler position, intestinal rest* by control of the peristalsis with morphine, *systemic support,* as strychnine, etc., and *lavage of the stomach* may check the ascent of the inflammation. *No food or drink should be given by mouth for three days;* normal salt solution or tap water by the rectum, by the Harris drip, or if not retained, by hypodermoclysis will supply the need of fluids. Nutrient enemata containing glucose will combat the starvation.

Chronic, septic, or gonorrheal cases are managed by small daily enemata, a hot-water bag, the electric-light bath, or counter-irritants to lower the abdomen; hot vaginal douches; boroglyceride or ichthyol tampons; and daily applications of the tincture of iodine to the vaginal fornix. For exudates, *pressure therapy,* by tight gauze boroglyceride packs, or by a rubber bag in the vagina filled with mercury or fine shot and counter-pressure with a sand-bag over the abdomen; the effectiveness of pressure is increased by the Trendelenburg posture. Thermotherapy, by means of special hot-air or electric-light apparatus, is beneficial. The entire pelvis may be exposed to dry hot air at a temperature of 200° to 220° F. for one-half hour once or twice daily.

In pelvic abscess, posterior vaginal section and drainage.

Hysterectomy with removal of the tubes and ovaries may be required later.

Tuberculous peritonitis, with fluid exudate is cured in many cases by laparotomy. The fluid is removed, the peritoneum sponged dry and the abdomen closed without drainage. Celiotomy should be followed by months of hygiene treatment, *including the daily exposure of the abdomen to direct sunlight.* The results are not so good where there are extensive adhesions and little or no fluid. The tubes should be extirpated, when their removal is possible and if infected, the ovaries and uterus, should be removed.

PELVIC CELLULITIS. PARAMETRITIS.

Pelvic cellulitis (parametritis) is an inflammation of the pelvic cellular tissue at the sides of the uterus, in the space between the bladder and uterus and in the uterosacral ligaments.

Its origin is an extension of infection from the pelvic viscera or peritoneum through the lymphatics or veins in the cellular tissue, or a primary infection through the lymphatics from the cervix.

Pelvic cellulitis is frequently secondary to peritonitis, while pelvic peritonitis, is probably always attended with some degree of cellulitis and conversely, cellulitis always produces some peritoneal edema. The parametrial thickening is most pronounced about the cervix and at the base of the broad ligaments where the cellular tissue is most abundant, and all or part of the pelvic cellular tissue may be involved. The infecting organisms produce an inflammatory exudate, which may be serous, plastic, or purulent, producing tumefaction of the cellular structures always leaving a permanent pathology.

The following varieties may be distinguished according to their location; lateral parametritis, between layers of broad ligament; posterior parametritis, beneath the retrouterine peritoneum; paracystitis, paraproctitis, paravaginitis.

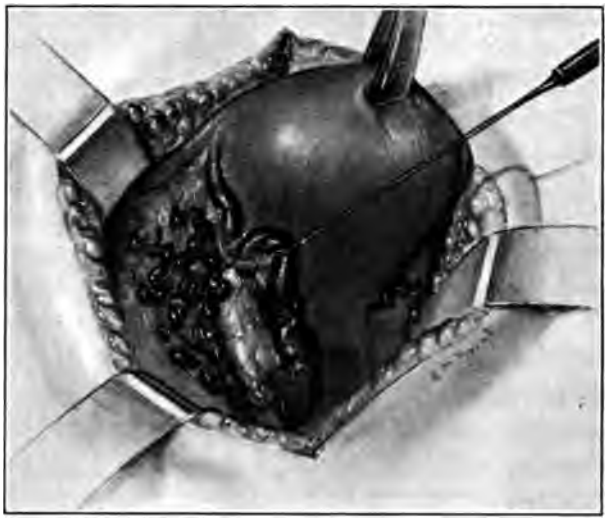


FIG. 123.—Varicose veins of the broad ligament. Drawn from a case giving a history of previous postpartal parametritis.

Symptoms.—The acute form always follows labor, abortion or some operation on the cervix. It may begin with a chill, though this is not constant, high temperature and pulse and local pain. The pain is usually more acute when the peritoneum is much involved; there may be digestive disturbance, dysmenorrhea, dysuria, dyschezia, or rectal or vesical tenesmus.

In the chronic form the patient complains of leucorrhea, dysmenorrhea, backache and local pain, which is increased before menstruation and by standing or walking and relieved on lying down.

Physical Signs.—The physical signs are local tenderness, swelling, bogginess in the cellular tissues about the uterus, with displacement and fixation of the uterus. The density varies according to the character of the exudate, which may be fibrinous, edematous, or purulent. The *mass blends intimately* with the uterus and adjacent organs and usually extends outward toward the pelvic wall.

In suppuration, the abscess may point into the vagina, on the abdominal wall, just above Pouparts' ligament, or may rupture into the bladder or rectum. Tumefaction of the rectovaginal septum may be present in paraproctitic extension.

Cellulitis has to be distinguished from pus tubes, ovarian abscess and pelvic neoplasms. The rectal examination will usually aid in making the differentiation, for with the finger in the rectum the extent and character of the parametrial infiltration may be readily mapped out.

Prognosis.—The disease is sometimes fatal in puerperal infections, but not so serious in other infections. In the majority of cases resolution takes place *and a shortened, thickened ligament with varicosities of the pelvic veins are the only remaining evidence of the infection.*

Treatment.—Treatment in acute cases is rest, systemic support, an ice-bag to the lower abdomen, hot vaginal douches or rectal enemata and in chronic cases, pelvic massage, boroglyceride or ichthyol tampons, pressure-therapy, thermotherapy and the treatment of the cervical catarrh.

Evacuation of pus collections is best done *per vaginam* in acute virulent infection; or by extraperitoneal incision above Poupart's ligament when the abscess points in that situation; rarely by peritoneal section.

Rupture into the rectum or by bladder may be treated by making a counter-opening in the vagina.

PELVIC HEMATOCELE.

Pelvic hematocele *is an encysted intraperitoneal collection of blood.*

Cause.—Pelvic hematocele usually results from a ruptured ectopic gestation, or tubal abortion, or a ruptured Graafian follicle. It is rarely due to hemorrhage from the pelvic veins in other conditions than extrauterine pregnancy.

Symptoms and Signs.—There is generally a history of a recently ruptured tubal pregnancy or of tubal abortion, with the systemic signs of internal hemorrhage. On physical examination, the observer finds a fluid tumor, usually retrouterine, which may reach the level of the umbilicus. The cervix being pushed upward close behind the pubis.

Evidence of coincident pelvic inflammation is usually primarily absent; infection frequently develops secondarily; and the pressure effects cause pain in the abdomen, pelvis and down the thighs.

Results.—Absorption may occur within two or three months, or suppuration may take place, with some degree of general septic infection.

Treatment.—None is necessary in small blood-collections in the absence of infection and pressure effects.

In extensive or repeated hemorrhages, or in failure of absorption or in suppuration, evacuation and drainage may be made by posterior vaginal section. When there is reason to believe that bleeding is still going on, the abdomen should be opened and the bleeding point secured.

PELVIC HEMATOMA.

Pelvic hematoma is a hemorrhage into the cellular tissue between the folds of the broad ligaments caused by rupture of varicose veins or intraligamentous rupture of an early tubal pregnancy. Its origin, symptoms and clinical course are similar to that of hematocele, except that it pushes the uterus toward the opposite side of the pelvis and cannot be felt separate from the uterus, as the bleeding of the tumor and uterus is so intimate.

Treatment.—The treatment is the same as that of hematocele, although surgery is seldom necessary.

CHAPTER XV.

DISEASE OF THE OVARIES.

CONGENITAL ANOMALIES.

THE following malformations have been observed:

1. *Absence of both ovaries,* which is rare. The uterus and other genital organs are generally imperfectly developed.

The woman is usually of masculine type or may be chlorotic.

2. *Absence of One Ovary.—The corresponding tube and half of the uterus are usually imperfectly developed.*

3. *Rudimentary Ovaries, Small Ovaries.*—In this anomaly the ovarian follicles may be absent or imperfectly developed.

The uterus and tubes are also generally defective.

4. *Hypertrophied Ovaries.*—These are rare. The size of ovaries varies somewhat within normal limits but seem to have no relation to the statue.

5. *Accessory Ovary.—An accessory ovary is a mass of ovarian tissue,* intraperitoneal or extraperitoneal, without corresponding tube or ligament. The so-called accessory ovaries are probably detached portions of the original ovary which have become separated during fetal life. A fibromyoma of the ovarian ligament may be mistaken for an accessory ovary.

DISPLACEMENTS OF THE OVARIES.

Hernia.—Hernia of the ovary is generally acquired, the commonest form is where the ovary is situated within the sac of an inguinal hernia.

Hernia of the ovary results, as a rule, from omental or intestinal adhesions which carry the ovary into the hernial sac when the ovary is thus displaced. Ovaritis, suppuration and cystic degeneration may complicate the displacement.

Congenital inguinal hernia of the ovary is very rare. It is usually unilateral. The other genital organs, as a rule, are defective.

Crural, ischiatic, obturator, umbilical and ventral hernias have very rarely been observed.

Diagnosis.—Hernia of the ovary has to be distinguished from an enlarged lymph gland, intestinal hernia and abscess and tumors of the round ligament.

The tumor, if it contains the ovary, is persistent and *becomes larger and more sensitive at each menstruation; pressure causes sickening pain and nausea,* and on bimanual palpation the ovary is not found in its normal situation, while the uterus is drawn into close proximity to the inguinal or femoral canal. Dysmenorrhea and dyspareunia are the rule.

Treatment.—Treatment consists in operation; releasing the constricting ring with conservation of ovary if sound. In the inguinal variety the canal is closed by the Bassini method. *Reduction by taxis is seldom practicable.*

Prolapse of the Ovary.—In prolapse the situation of the displaced ovary may be beside or behind the uterus, below the normal level, frequently in the bottom of Douglas' pouch. *The ovary is usually enlarged* edematous and may be adherent.

The left ovary is more frequently prolapsed during pregnancy because it is heavier than the right, and because of the absence of valves in the left ovarian vein, as that vein opens at a right angle into the renal vein, and by reason of its proximity to the rectum and the consequent mechanical interference that occurs in chronic constipation so common in women.

Causes.—The causes are relaxation of ovarian and ovario-pelvic ligaments, *e. g.*, from subinvolution after pregnancy; increased weight of the ovary; retrodisplacement of uterus and downward displacement of the tube adherent to the ovary. Prolapse sometimes is congenital.

In continued prolapse the weight of ovary is increased by passive hyperemia the stroma becomes infiltrated with serum and round cells and chronic ovaritis may result.

Symptoms.—There may be no symptoms in minor degrees of prolapse. In extreme degrees the symptoms are those of ovaritis, *i. e.*, pain, especially on standing or walking; premenstrual pain; sometimes menorrhagia, dyspareunia, dyschezia, faintness and nausea; frequently headache, digestive disturbances, hysteria and pain in the corresponding breast.

Physical Signs.—The displacement is readily made out by bimanual examination. The ovary is detected as a smooth sensitive mass in the cul-de-sac; the displacement may be best made out by rectoabdominal palpation. Scybala in the rectum may be mistaken for a misplaced ovary. *Fecal masses are insensitive and may be indented with the finger tips.*

Treatment.—Palliative measures may be used when the ovary is non-adherent. The indications are to reduce the size and strengthen the supports.

The non-adherent ovary may be reposited in the knee-chest posture, which balloons the vagina by admission of. air and carries the pelvic viscera upward, the procedure to be repeated daily, or p. r. n. The lateroprone or half-face posture may also serve to raise the ovary, which is then supported by vaginal tampons of lambs' wool, renewed every forty-eight hours.

Displacement of the uterus must be corrected.

When the ovary is inflamed or adherent counter-irritation with the patient in the knee-chest posture with tincture of iodine applied once or twice weekly to the vaginal fornix beneath the affected ovary, or boroglyceride or ichthyol-glycerin tampons used to relieve the sensitiveness. Hot vaginal douches and sitz baths do much toward the relief of the passive congestion.

General massage, Faradism and systematic indoor exercises as walking on all fours may be employed to strengthen the support of the pelvic organs and abdominal muscles. The bowels should be opened daily with saline laxatives.

Operation.—Partial or total extirpation is usually indicated in presence of adhesions and in intractable disease of ovaries and tubes.

A sound or comparatively sound ovary may be stitched to the upper edge of the broad ligament or to the uterine cornu or be held up by the shortening of the ovario-pelvic ligament.

OÖPHORITIS.

Inflammation of the ovary, but seldom has to be considered clinically as a pathological entity, for the condition is usually associated with or is secondary to a tubal infection and the symptoms and signs of one are indistinguishable from those due to the other.

Oöphoritis, or ovaritis, is an inflammation of the ovary. It may be acute or chronic.

Acute Oöphoritis.—Acute oöphoritis is usually bilateral. The ovary is swollen and edematous sometimes to several times it normal size; the stroma becomes infiltrated with serum and a lymphatic exudate is poured out on its surface which forms adhesions with adjacent structures.

Causes.—The cause may be from (1) the extension of gonorrheal infection from the uterine tube across the peritoneal cavity; (2) septic infection which is most frequently associated with childbed fever and reaches the ovary by the parametrium through the hilum or by producing a complicating peritonitis which in turn causes a perioöphoritis.

Infection sometimes proceeds from other sources by extension or through the blood or lymph channels in this way the interior of the ovary may become infected. The streptococcus may reach the ovary by this hematogenous route, with no associated tubal infection and produce an ovarian abscess or from some remote septic focus and cause an interstitial ovaritis.

Gonorrhea usually causes a perioöphoritis and adhesions; rarely, however, the gonococcus may invade the parenchyma in which case it may cause ovarian abscess. Infection of a torsioned ovarian cyst may occur from adhesion of the intestine and migration of the Bacillus coli into the cyst.

Ovaritis may also be caused by any of the infectious diseases and by arsenic and phosphorus poisoning. *Tuberculous ovaritis is not infrequent.*

Terminations.—Inflammation of the ovary may terminate in resolution, sclerosis, chronic oöphoritis, cystic degeneration, adhesion or abscess with partial or total destruction of the ovarian tissue.

Symptoms.—In the acute stage the symptoms are usually indistinguishable from those of salpingitis. The patient complains of chills and fever, and of intense pain and tenderness in the ovarian region, radiating to the back, down the thigh and to the breast. Sometimes there is a uterine hemorrhage (metrorrhagia); and occasionally nausea, dysmenorrhea, dyspareunia and dyschezia.

Physical Signs.—After the acute peritoneal symptoms have subsided the ovary may be recognized as an enlarged, exquisitely sensitive, smooth or nodular tumor, and usually prolapsed in the lateral or posterior fornix. It is frequently adherent.

Treatment.—The treatment is rest; an ice-bag or hot applications or the tincture of iodine over the lower abdomen; moderate saline catharsis or daily enemata, morphine endermically (oleate) if used at all; and hot vaginal douches except when they aggravate the pain.

If pus forms, drainage should be made by vaginal section.

Oöphorectomy may be necessary after all of the acute symptoms have subsided.

Chronic Oöphoritis.—Chronic oöphoritis occurs in three forms:

1. Atrophic oöphoritis.
2. Hyperplastic oöphoritis.
3. Cystic oöphoritis.

In the atrophic form the ovary is sclerotic of small size, with a nodular surface and thickened tunic.

The hyperplastic form may be recognized by the increased size and nearly smooth, white surface of the ovary.

The cystic form is characterized by irregular groups of cysts throughout the gland, the result of unruptured Graafian follicles.

The causes are the same as in acute ovaritis.

Symptoms.—Chronic ovaritis, like acute inflammation of the ovary, is but part of the general pelvic inflammatory process, being associated with tubal and peritoneal inflammation, hence the symptomatology is that of chronic pelvic inflammation. There is pain in one or both ovarian regions, which is aggraved by standing or walking and before and during menstruation. The pain sometimes extend to the thigh, and there are dyschezia, dysmenorrhea and dyspareunia. With large cystic ovaries there may be menorrhagia or metrorrhagia; *in atrophic ovaritis there is amenorrhea;* pain in the breasts, hysteria and hystero-epilepsy are often associated with chronic ovarian inflammation; frequently there is sterility owing to the destruction of the follicles or the thickened capsule or owing to the closure of the tubes resulting from the general pelvic inflammation.

Physical Signs.—The ovary is tender and enlarged—or in the cirrhotic variety smaller than normal. *A large ovary may be normal, or a small one pathological.*

Rectal examination is often useful.

Prognosis.—Spontaneous symptomatic cure may occur at the menopause, seldom before, or an abscess may result from infection, or the ovary may be changed into a mass of small cysts, little or no stroma remaining. Sterility is common.

Treatment.—The treatment is rest in the recumbent posture, *especially at the menstrual period* and an empty lower bowel. Tincture of iodine to the abdomen over the ovarian region and to the vaginal fornix, repeated once in three days helps to relieve pain, and boroglyceride or ichthyol-glycerin tampons; hot douches and saline laxatives improve the pelvic circulation. While massage, baths, tonics, etc., contribute to the restoration of the general health.

For the pain, chloride of gold and sodium, grain $\frac{1}{10}$, and extract of cannabis, grain $\frac{1}{4}$, in pill t. i. d.; or tincture of pulsatillæ, ♏x t. i. d., should be given. When local and systemic measures fail, surgical intervention may be employed; this includes liberating adhesions, ignipuncture or resection of diseased structures, or in extensive structural change, oöphorectomy.

Cysts when few, superficial, rounded and detached, are usually dropsical follicles and do not require treatment. When crowded together in masses of irregular shape and found throughout the gland, they should be resected or the gland extirpated.

The ovary may be split to its hilum for examination if necessary.

A pure neurosis is not an indication for oöphorectomy.

Hypertrophy of the ovary may be the result of chronic inflammation or of chronic hyperemia of mechanical origin. The stroma is made up of dense white fibrous tissue rich in spindle-shaped cells. There is a marked lack of primordial follicles. Hypertrophy of the ovary is commonly associated with the fibroid uterus.

HEMATOMA OF THE OVARY.

Hemorrhage may occur in one or several ovarian follicles, or into a follicular cyst, when it is called a *follicular hemorrhage*, or into the ovarian stroma, when it is known as an *ovarian apoplexy*. The follicular cyst may reach the size of a walnut or larger. In the stroma the extravasations are usually minute and multiple, although they may reach a diameter of two or three inches.

Hematocele may result from rupture of the follicle into the peritoneum.

Causes.—The causes are those of ovarian hyperemia, such as venereal excesses, menstrual congestion, pelvic and abdominal tumors or diseases of the heart, liver, kidneys or lungs; also those of abnormal blood states, *e. g.*, scurvy, acute fevers, or extensive burns.

Symptoms.—The symptoms depend on the extent of the hemorrhage; small hemorrhages giving no symptoms. In larger extravasations there is pain in the affected ovary, menorrhagia, nausea and those of oöphoritis.

Physical Signs.—While there is enlargement and tenderness of the ovary, the diagnosis before operation is seldom possible.

Prognosis.—Possible terminations are absorption, rupture, persistent hematoma or suppuration.

Treatment—The treatment at the onset is rest, with an ice-bag to the abdomen over the seat of the pain.

Later, counter-irritation, hot vaginal douches, boroglyceride or ichthyol-glycerin tampons, general hygienic and tonic measures may be given, with oöphorectomy, partial or complete, as a last resort.

OVARIAN HYDROCELE.

Ovarian hydrocele is rare. It originates in the peritoneal coat which in some instances envelops the ovary and is comparable to hydrocele of the testis.

The abdominal end of the tube opens into the ovarian sac, and the tube as well as the sac is distended with fluid. The contents are clear, straw-colored fluid, and may escape into the uterus or may suppurate.

Symptoms and Physical Signs.—The symptoms and physical signs are similar to those of small ovarian or tubo-ovarian cysts.

Treatment.—The treatment is extirpation of the ovary and its sac, saving as much of the tube as is practicable.

RETENTION CYSTS OF THE OVARY.

Retention cysts of the ovary occur in two forms:

1. Cystic follicles.
2. Corpus luteum cysts.

Follicular cysts are primary retention cysts of vesicular ovarian follicles (Graafian follicles). They may be single or multiple; their size, when multiple, is rarely more than 1.5 cm. in diameter. Exceptionally, single cysts may reach a diameter of 10 cm.

Follicular cysts are generally bilateral and the ovary is more or less enlarged. They are commonest during the period of sexual maturity.

The cyst wall is a light gray, thin, transparent membrane and the contents are usually clear serum; rarely the content is pus or bloody fluid.

Cysts which are a little larger than normal follicles are not pathological.

Cause.—The cause is found in the failure of mature follicles to rupture, usually owing to the results of chronic ovaritis and a thickened tunic.

Symptoms and Physical Signs.—In uncomplicated cystic degeneration there are generally no symptoms; exceptionally, the patient may complain of pelvic pain, dysmenorrhea, backache, menorrhagia, and general nervous disturbances. The ovary is usually enlarged and abnormally tender.

Treatment.—In pain, dysmenorrhea and sensitiveness which are distinctly referable to cystic degeneration, evacuation of the cysts, excision of the diseased structures, or removal of the entire ovary is is called for.

Evacuation may be made with the cautery when the cysts are few and small, or the cyst wall may be enucleated and the wound in the ovary, especially in the larger cysts, closed with sutures.

CYSTS OF THE CORPUS LUTEUM.

Cysts of the corpus luteum are due to hemorrhage into the mature follicle which has failed to rupture. In size, they reach that of a walnut, rarely larger. Their color is brownish. The cyst walls are thick and yellowish. The contents are disintegrated blood and fibrinous lining membrane.

Treatment.—The treatment is the same as in other retention cysts.

Lutein Cysts.—These cysts resemble those derived from the corpus luteum—in that the wall is made up of layers of lutein cells, of various degrees of thickness. There is also a diffusion of lutein cells in the stroma of the ovary. The early lutein cyst is usually single, but it may be multiple and in some cases both ovaries may be involved. The cyst content is fluid, semifluid, or opalescent, or blood stained. These cysts are frequently found associated with hydatidiform mole or chorioepithelioma and have been observed to retrogress after the removal of the intrauterine mole. This fact has been repeatedly demonstrated clinically by the writer. That there is a definite relation between these two conditions seems to be shown by one of the writer's cases—when one of his associates removed both ovaries on the diagnosis of ovarian cystomata complicating pregnancy; within forty-eight hours the patient spontaneously delivered herself of a hydatidiform mole. No recorded specimens have shown malignant degeneration.

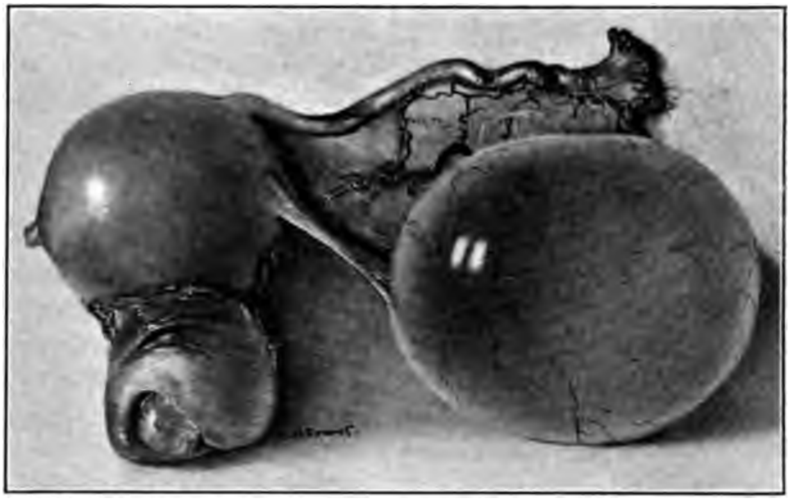


FIG. 124.—Simple lutein cyst of the ovary, showing the tubo-ovarian circulation in the mesosalpinx.

Treatment.—Aside from the tumors of this type, complicating hydatids—the management is usually surgical. Occasionally a cyst of this type will rupture spontaneously with slight peretoneal reaction and disappearance of all clinical symptoms. In the presence of a mole, it is safe to leave the enlarged ovaries as retrogression will surely follow.

TUBO-OVARIAN CYSTS.

Tubo-ovarian cysts are rare. They result from distention of a fold of peritoneum which sometimes partly envelops the ovary.

When the tube remains pervious, drainage may occur through the uterus, when the cyst is called a profluent tubo-ovarian hydrops.

CHAPTER XVI.

OVARIAN TUMORS.

THE ovary may be the seat of a great variety of tumors.

These ovarian growths are best classified according to their histological origin.

A. *Parenchymatogenous Tumors* (Epithelial Tumors).—

1. *Benign tumors.* Cystadenomata.
    (*a*) Simple cystadenomata. Pseudomucinous cysts.
    (*b*) Papillocystadenomata.
2. *Malignant tumors.* Carcinomata.
    (*a*) Solid.
    (*b*) Cystic.
3. Ovarian embryomata (dermoid cysts and teratomata).

B. *Stromatogenous Tumors.*—Developed from the tissues of the ovarian stroma.

1. Fibromata.
2. Sarcomata.
3. Endotheliomata.
4. Mixed tumors.

Cystadenomata.—**Synonyms.**—*Glandular proliferating cysts, ovarian adenomata, multilocular cysts.* Cystadenomata are the commonest form of ovarian tumors.

This form of cyst may develop at any age, but occurs most frequently between the ages of twenty and fifty years.

They are generally intraperitoneal; though rarely they may develop as extraperitoneal tumors, owing to an anomalous position of the ovary. As a rule, they are unilateral; when bilateral the cysts are unequally developed. The Fallopian tube is not involved in the cyst.

Origin.—The origin of the growth is probably congenital, and developed from some of the epithelial elements of the ovary.

Three theories of origin have been suggested.

1. That these cysts spring from the granulosa cells of the Graafian follicle.

2. That they result from down growths of the germinal epithelium, from the surface of the young ovary, during its development, and remain in the stroma of the ovary as epithelial rests which in later life develop into glandular cystomata.

3. That these glandular cysts arise from the embryological remains of the Wolffian tubules; the pseudomucinous tumors, from the secreting tubules—while the serous tumors develop from the collecting tubules. In support of this latter theory of origin, Clark makes the following résumé.

(*a*) In the broad ligaments of the adult woman, the Wolffian duct and its collecting tubules are represented by the so-called Gärtner's duct, and the parovarian tubules.

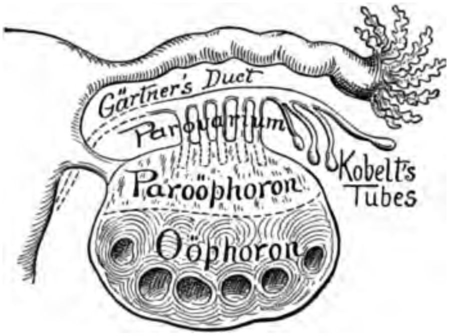


FIG. 125.—Showing the cystic regions of the ovary. (Ashton.)

(*b*) If MacCallums excellently reconstructed tubular system of the Wolffian duct is correct, the secretory portion of the tubules must be accounted for in the adult ovary.

(*c*) The origin of multilocular-glandular ovarian cysts is much more rationally explained upon the basis that they spring from embryonic remains of the secretory system than from pathological changes occurring in the Graafian follicle or in the remains of the so-called Pflugers tubules.

(*d*) That in the study of serial sections from Clark's case, where at the hilus of the ovary he found a number of small cysts which could only represent cystic dilatation of the remains of the Wolffian body, which suggests in its devious ramifications that system described by MacCallum, as the secretory portions of the Wolffian tubules.

(*e*) At various points in this tubular system dilatations forming loculi were noted, suggesting that the multilocular cysts arise from the outgrowths of these embryonic remains of the secretory portions of the tubular system of the Wolffian body.

The *size is limited only* by the distensibility of the abdominal wall. They are of rapid growth and may attain a weight of one hundred pounds.

They may be nodular in shape from the presence of smaller mucous and follicular cysts in the cyst walls, but are generally spherical or ovoid, and of smooth outline.

Structure.—A cystadenoma arises within the substance of the ovary and as it grows destroys the ovary. Externally the cyst is usually smooth, glistening and pearl-gray; sometimes there are brownish, greenish, purplish, or black patches on the surface, or the surface may be roughened by inflammatory exudates and adhesions. The outer wall is of fibrous tissue, 2 to 6 mm. in thickness and usually arranged in layers.

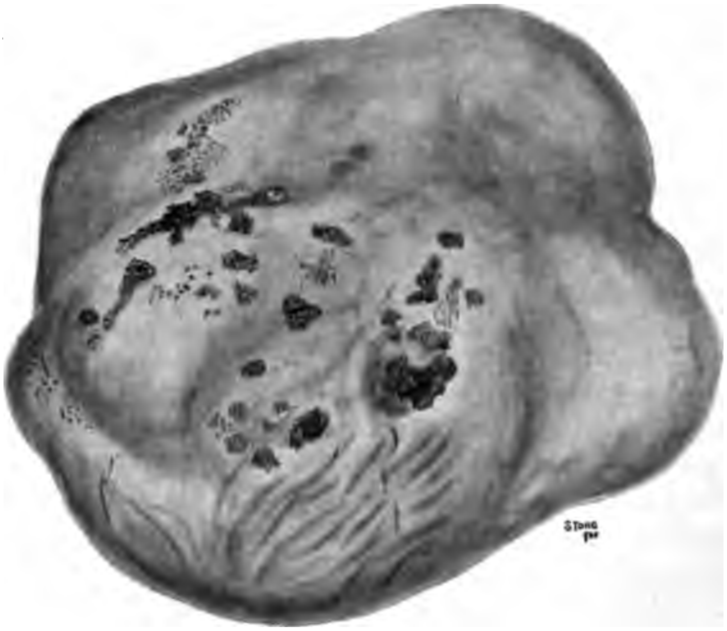
Glandular cysts are always multilocular, hence, internally the tumor is made up of numerous daughter cysts of varying sizes. When the cysts are small, sections of the tumor present a honeycombed appearance, owing to the great number of daughter cysts; later adjacent loculi merge into one another by atrophy of the septa, forming one or more large cavities. The lining of the cavities resembles mucous membrane. It is common for denser lobules, simulating solid tumors, to project inward from the cyst walls.

The contents vary in different cysts and in different loculi of the same cyst. The contents may be thin, thick and viscid or jelly-like; having a greenish or brown or black color from the presence of altered blood, or it may be nearly colorless.

The cyst fluid contains paralbumin, metalbumin, mucin, chloride of sodium and various other salts. Cholesterin is sometimes present.

The tumor is commonly attached to the uterus by a pedicle *which comprises the ovarian ligament, the upper part of the broad ligament, and the uterine tube and bloodvessels.* The pedicle varies greatly in length, breadth and thickness.

PLATE X



Papillocystadenoma of Ovary, showing the Characteristic Warty Growths Perforating the Cyst Wall.

Occasionally the tumor may be sessile and is then often intraligamentary in position in which case it is covered with peritoneum.

Glandular cystomata at first lie within the true pelvis, but later unless adherent, as they increase in size they rise out of the pelvis and distend the abdomen. When the cyst lies within the pelvis, the uterus is usually displaced upward, forward and to one side. When the cyst becomes large enough to distend the abdomen it either displaces the uterus downward or pulls it above the pelvic brim.

Prognosis.—*Glandular cysts grow rapidly,* producing severe pressure symptoms which so embarrass the action of the abdominal viscera as to cause death within three years.

Papillocystadenomata.—These are paroöphoritic cysts developed from the remains of the Wolffian body and characterized by *soft and friable warty growths, papillomata on the inner surface;* the papillomata frequently break through and perforate the cyst wall and become implanted on the omentum and usually on the peritoneum, *or they may grow from the outer surface primarily* and set up a papillomatous peritonitis with an exudate of free fluid in the peritoneum.

An invariable accompaniment of this condition is ascites which increases with the degree of peritoneal involvement.

Papillocystadenomata are seldom observed before the twenty-fifth year. *They are generally unilocular; very frequently bilateral, affecting both ovaries in 50 to 75 per cent of the cases,* and are usually smaller than glandular cysts.

Microscopical Findings in Cystadenopapilloma.—The lining of the loculi of a serous cystadenopapilloma consists of a cubical or columnar epithelium. The cells are not so long and thin as in the case in a pseudomucinous cyst.

The papillomata consist of a connective tissue core covered by an epithelium similar to that lining the cyst. In the villous type the papillomata are long and feathery and the epithelial proliferation in such cases may be very active, bordering on malignancy. In some instances the warty growths are hard and fibrous and consist of elevations of connective tissue, this type of excrescence is usually intracystic and has no tendency to peritoneal transplantation

Contents.—The fluid contents are thin and clear, straw-colored and dark from contained blood. The warts and fluid contents of these cysts infect the tissues with which they come in contact, this explains the implantation of these papillomatous growths when the content of the cyst is spilled during removal.

Prognosis.—*The prognosis is bad owing to the pressure-effects in large cysts, to the tendency to rupture, and to the implantation of papillomatous growths on the peritoneum.* They may or may not recur after removal, when there has been leakage of the contents during operation.

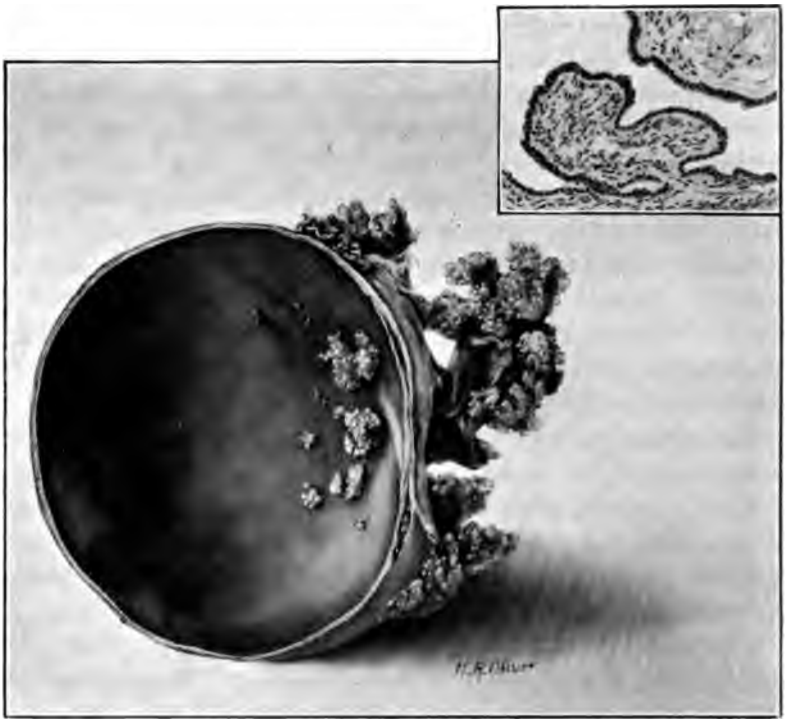


FIG. 126.—Papillocystadenoma of the ovary showing how the excrescences occurs on the inner cyst wall. Histological appearance of excrescences.

Secondary growths may develop in the omentum, peritoneum, or in the abdominal cicatrix. The bladder, rectum, or uterus may be invaded. *Ascites is usually present when the peritoneum is involved.*

Carcinomata of Ovary.—*About 15 per cent of all ovarian tumors are carcinomatous* and while it may begin as a primary disease, it is usually, if not always, secondary to carcinoma of the uterus, breast, gall-bladder, or digestive tract. It occurs at any age, being most common between forty-five and fifty-five, but may occur in younger women. *Primary carcinoma may attack a normal ovary, but is more likely to occur in a cystic or solid tumor of the gland.*

The disease is bilateral in 46 per cent of the cases. *Solid carcinomata* occur usually as lobulated growths which may develop into large solid tumors, the growth in time breaks through the ovarian tunic and becomes adherent to adjacent structures. Solid carcinomata are found in about 10 per cent of the cases.

Cancer of the ovary may be of the medullary, scirrhous, or colloid type. The size is rarely more than 10 cm. in diameter, although it may reach that of a man's head.

Macroscopically such tumors on section have a firm surface with paler soft areas. The softening may be so great as to make these areas brain-like in character, while contained areas of cystic degeneration may be present.

Microscopically the tumor consists of solid plugs of epithelial cells, surrounded by stroma. In some instances the malignant cells are scattered singly or in small parches throughout the connective tissue stroma.

Cystic carcinomata have the general characteristics of cystadenopapilloma and are made up of cystic spaces, single or multiple, while as a rule the solid portions are soft and friable being soft, whitish, putty-like growths.

The contents of the cyst cavities are serous or pseudomucinous, creamy and sometimes bloody.

These tumors may grow to very large dimensions, and are most frequently observed between the ages of thirty and sixty years. Ascitic accumulations are common.

Embryomata.—*Dermoid cysts* are unilocular tumors, characterized by a lining membrane resembling skin and containing the structures of the skin, *e. g.*, sebaceous- and sweat-glands, hair, nails, etc. They may contain an elementary maxilla, teeth, cartilage, unstriped muscle fiber, and a brain-like matter in the solid part of the tumor, which usually projects into the cyst cavity and is called the "dermoid eminence." The principal content is fatty or sebaceous material. *The latter is exceedingly irritating, and its contact with the peritoneum is likely to cause peritonitis.*

Dermoids may develop in intrauterine life or at any age; they occur most frequently during the period of sexual maturity. They are the most common variety of ovarian tumor found prior to puberty.

The dermoid may form part of a tumor, the larger portion of which is a cystadenoma. *They are especially prone to torsion of the pedicle.*

Their origin is from parthenogenetically developed ova. Dermoid tumors are of slow growth, seldom attain large size, and are generally intraperitoneal and unilateral. They may become adherent to adjacent structures and rupture into one of the hollow viscera.

Frequency.—Dermoids comprise less than 10 per cent of ovarian tumors.

In *size* they are usually not larger than the adult head, though they may fill the entire abdomen.

Their *shape* is usually globular; they seldom form adhesions except when complicated with tubal infection, and in general appearance are pearl-gray or faint yellow, with a smooth or slightly lobulated surface, often presenting areas of bony hardness.

Teratomata.—Teratomata have the same origin as dermoids. They are large, solid, nodular tumors of irregular density and *are malignant.*

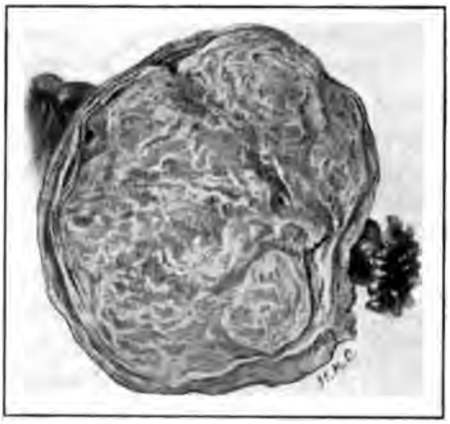


FIG. 127.—Fibroma of the ovary. Section showing histological formation.

Fibroma and Myoma.—Fibroma and myoma make up about 2 per cent of ovarian tumors. Fibroids may occur at any age but are met with more frequently in young women. They are always unilateral and pedunculate and are liable to the same secondary changes as uterine fibromata.

The usual limit of growth is about 15 cm. in diameter.

Their structure and density is substantially that found in uterine fibroids. The ovary is symmetrical and hard and usually is not attached to the tube.

Ascites may be present, which prevents adhesions to adjacent structures.

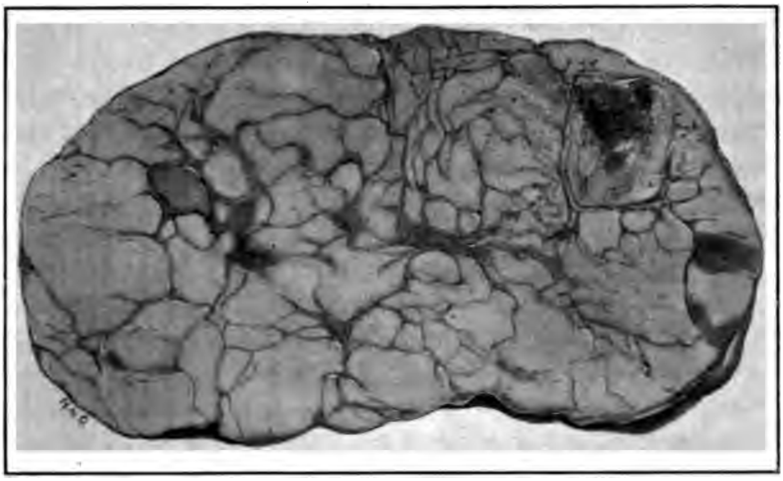


FIG. 128.—Sarcoma of the ovary. Tumor removed from a girl, aged eighteen years showing brain-like appearance on section. (Author's collection.)

Sarcoma.—Sarcomata are the most infrequent solid tumors of the ovary. Only about 3 per cent of ovarian tumors are sarcomatous. They occur in two types (*a*) spindle-celled, (*b*) round-celled. The tumor is smooth, soft and sometimes cystic, and the general shape of the ovary is retained. It has a brain-like appearance on section. It is nearly always pedunculate and bilateral in about 30 per cent of the reported cases.

The size varies from that of a small tumor to that of an adult head or larger, and it may occur at any age; the growth is rapid and may assume enormous proportions in a few months, especially if stimulated by pregnancy. Metastases may occur in remote organs. *All solid tumors of the ovary, and especially sarcomata, are frequently complicated with ascites.*

The spindle-cell variety is the more common in adults.

Endotheliomata.—Endotheliomata of the ovary have their origin in the endothelial lining of the blood or lymph vessels. Histologically they are very similar to metastatic carcinomata.

Mixed Tumors.—Mixed tumors contain both connective tissue and epithelium, and may be benign or malignant.

Parovarian Cysts.—Parovarian cysts are divided into those which develop from (1) Kobelts' tubules, and (2) those from the vertical and transverse tubules of the parovarian tubules, and so include all retention cysts springing from the parovarian tubules. They are intraligamentous, generally unilocular, unilateral, *and of very slow growth.* They lie in close contact with the uterus and displace it to the side opposite that from which they spring. In the smaller cysts the walls are thin and translucent, in the larger ones opaque, and of a pearly bluish-white color.

The peritoneal coat strips off easily.

The ovary is usually of normal shape and structure, or may be greatly flattened by pressure, and is usually attached to the side of the cyst. The greatly elongated uterine tube stretches across the surface of the tumor.

The fluid contents of parovarian cysts are of low specific gravity, not exceeding 1010. The fluid is non-irritating to the peritoneum. Adhesions are infrequent. They occur during the period of sexual maturity, and seldom attain a size of more than 15 cm. in diameter.

Intraligamentous cysts are less common than ovarian cysts, about 10 per cent of all cysts of the ovary being parovarian in origin.

Complications of Ovarian Tumors.—The chief complications met with in ovarian tumors are:

1. Infection.
2. Rupture.
3. Torsion.
4. Malignancy.

Infection.—This is commonest in dermoids, where the contents of the cyst may be converted into pus. However, pyogenic infection of an ovarian tumor is apt to follow any condition which leads to damage of the tumor, *i. e.*, trauma or axial torsion. Infection frequently results in peritoneal adhesions to adjacent structures, and gas may be generated into a suppurating cyst when the infection has come through an intestinal attachment.

Torsion of the Pedicle.—Torsion of the pedicle is the most frequent accident to which these growths are subject and is most likely to occur in pregnancy or during labor, or in the puerperium and in small or medium-sized cysts of smooth surfaces, in bilateral cysts, and in dermoids, where an axial rotation of the tumor may take place, due to the peristaltic action of the intestines. The consequences *are edema, hemorrhage into the wall of the cyst cavity, necrosis of the tumor and sepsis, peritonitis, intestinal obstruction, and in rare cases, atrophy of the cyst or detachment from its pedicle.* Twisting of the pedicle may occur slowly or rapidly. In slow torsion the bloodvessels become constricted and intracystic hemorrhage takes place; the adhesions to the peritoneum become vascular and nourish the tumor. In rapid torsion of the pedicle, the size of the cyst may increase with great rapidity, and adherent knuckles of intestine may become obstructed. The effects are grave in proportion to the acuteness of the torsion.

Adhesions to the surrounding structures are common.

Hemorrhage into the cavity of the cyst sometimes occurs from other causes than torsion of the pedicle. It is found in papillomatous cysts.

Ascites.—Ascites is an occasional complication. It occurs most commonly in papillomatous growths, and is always present when the growth extends beyond the confines of the tumor and invades the peritoneum.

Rupture.—*Rupture may take place from* (1) *degeneration of the cyst* wall; (2) from external violence; (3) from suppuration, or (4) from perforation by papillomatous growths. *A cyst may rupture and refill repeatedly.* Rarely a spontaneous cure may follow the first rupture. *Peritonitis and death may ensue from rupture of a dermoid cyst, a suppurating cyst, or a glandular cyst with colloid contents. Rarely death results from hemorrhage.*

Rupture of a papillomatous cyst always leads to a papillomatous infection of the omentum and peritoneum. Rupture may occur into adjacent viscera or through the abdominal wall at the umbilicus.

Calcification of the cyst wall is rare.

Carcinomatous or sarcomatous degeneration occurs exceptionally in glandular and in dermoid cysts. On the other hand, carcinomatous degeneration is particularly likely to affect papillomatous and serous cysts.

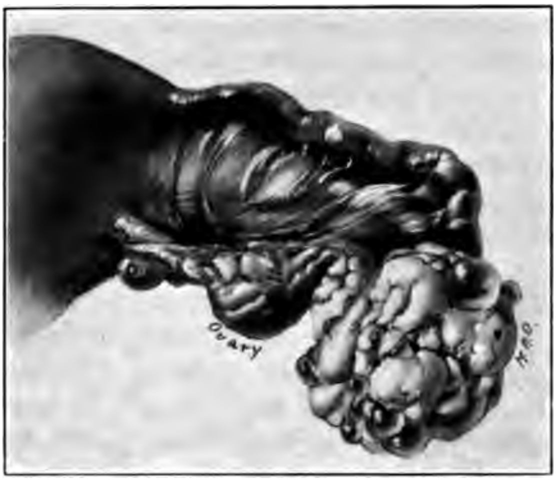


Fig. 129.—Calcareous degeneration of the ovary. (Author's collection.)

Pressure Effects.—Hydroureter, hydronephrosis, uremia, infection of the kidney, albuminuria, cystitis, hemorrhoids, abdominal ascites, and edema of the lower extremities may be present in large tumors, from venous obstruction due to the tumor pressure.

Symptoms of Ovarian Tumors.—*Pain.*—In uncomplicated ovarian cysts, there is *little or no pain.* Pain is common, however, when the tumor is incarcerated or adherent, or in twists of the pedicle. In large cysts the patient experiences more or less discomfort from pressure, sometimes complaining of dysuria and dyschezia, vesical and rectal tenesmus. Pelvic tenesmus and backache are infrequent. *Menorrhagia, when it occurs, is usually due to associated disease of the uterus and adjacent organs.*

Amenorrhea may be present when both ovaries are extensively diseased. Mammary disturbances may be noted. Dyspnea, palpitation of the heart, and digestive disorders are common with large tumors. The *facies ovariana* is characteristic of very large growths. The face is pale, thin, anxious, pinched and wrinkled; the angles of the nose and mouth are drawn down; the lips are thin and the eyes are sunken.

Symptoms of Complications.—*Torsion of the Pedicle.*—*The symptoms are not marked in slowly developed torsion. In sudden torsion,* however, *there is abrupt and intense abdominal pain, vomiting, collapse,* and a rapid increase in the size of the tumor, with signs of peritoneal irritation and usually metrorrhagia with a gradually increasing leukocytosis. The clinical picture simulates that of ruptured ectopic pregnancy.

Rupture.—There is usually a *history of injury, followed by sudden abdominal pain,* sometimes attended with collapse; diuresis; disappearance or alteration in the shape of the tumor. The physical signs of a cyst are *replaced by those of hydroperitoneum,* and sometimes by those of peritonitis.

Physical Signs of Ovarian Tumor.—*Small Tumors.*—*Bimanual Examination.*—The tumor is distinguished mainly by its *shape, its relation to the uterus, its consistence,* and by the *history of its slow growth.*

The shape is globular or ovoid, and its surface is smooth and regular in outline.

The *situation* is generally beside or behind the uterus, sometimes in front of it, displacing the uterus in the pelvic cavity.

In cysts we can *generally elicit the fluid feel,* fluctuation varying with the density of the contents and the teneness of the cyst.

The history helps to distinguish cystic ovarian tumors from uterine tumors, gestation, and the products of pelvic inflammation. The tumor is usually movable, independently of the uterus, intraligamentous cysts generally have less mobility, *are deep in the pelvis, and more intimately connected with the uterus, which is* carried upward and forward by the growing tumor.

Ovarian cysts have to be distinguished from sactosalpinx, small pedunculated fibroids of the uterus, and ectopic gestation.

Large cysts are recognized by abdominal and bimanual examination. The abdomen is enlarged, the abdominal veins are often prominent, lineæ albicantes are present. Palpation marks out the globular nodular mass springing from the pelvis. Abdominal percussion is flat over the tumor, resonant above and far back along the lateral borders.

Fluctuation.—A fluid wave is obtained wholly or partially through the tumor when the contents are a thin fluid and the tumor is not subdivided into small cavities by numerous septa.

The uterus is distinct from the tumor and independently movable unless adherent to the tumor or fixed by pressure. The uterus is displaced and is usually in front of the tumor, low in the pelvis, or above the symphysis, though it may be displaced backward and be found in the pelvis under the tumor.

In parietal adhesions the tumor moves with the abdominal wall. Edema of the external genitals and of the lower extremities are evidence of pressure and dense pelvic attachment.

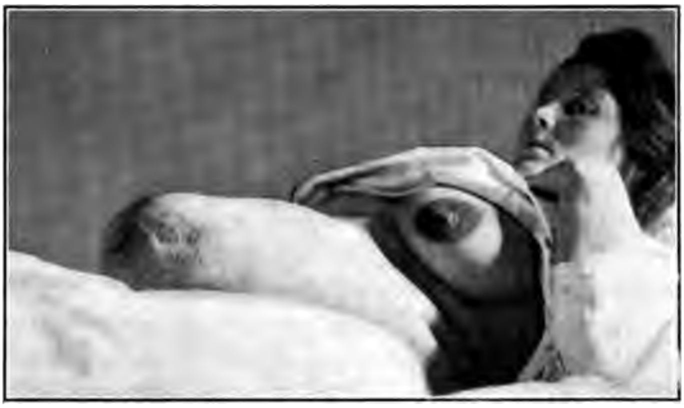


FIG. 130.—Ovarian tumor, complicating pregnancy, with ventral hernia. The sac contains the cyst.

Hemorrhoids or varicosities of the labia are noted in incarcerated tumors which obstruct the pelvic circulation.

Ovarian tumors must be distinguished from ascites; uterogestation; pregnancy in one horn of the uterus bicornis, especially with hydramnios; ectopic gestation; fibroid, a fibrocystic growth of the uterus, or an edematous fibroid; fat in the abdominal wall; blood or pus collections in the tube or peritoneum; retroflexion of the uterus; phantom tumor; hepatic, splenic, or renal tumors; tympanites; dilated stomach; fecal tumor; and distended bladder.

The writer has seen *many cystic tumors of the abdomen disappear on passing a catheter.* The production of an artifical pneumoperitoneum and fluoroscopy will frequently aid in making the differential diagnosis.

In ascites, except when the distention is extreme, or when the mesentery is short, or the intestines bound down by adhesions, *the percussion note is tympanitic at the summit of the tumor,* the umbilicus is prominent, and the free fluid in the peritoneum may be demonstrated by percussion with the patient in different postures.

The question of diagnosis rests most frequently between an ovarian or parovarian tumor and a uterine fibroid. Cystic tumors may be distinguished by their consistence, their relation to the uterus, the absence of one ovary or the presence of both, and if possible, by mapping out the pedicle. The latter runs to the uterine cornu in an ovarian tumor.

Prognosis.—Cystadenomata, papillocystadenomata, and malignant tumors of the ovary, without operation, are usually fatal within three years, death occurring from exhaustion, peritoneal infection, embolism, uremia, obstruction of the bowels, etc. In either variety, a fatal termination obviously may be greatly hastened by complications. Life may be saved in at least 95 per cent of cases by early operation.

Of ovarian tumors in women between forty and sixty years of age, 50 per cent are malignant. *In girls under fifteen years of age nearly all are malignant* (sarcoma or sarcomatous degeneration of a cyst).

Treatment of Ovarian Tumors.—*Ovariotomy is indicated immediately the growth is discovered.* Exceptions are extreme exhaustion or grave systemic disease, and in most cases of extensive malignant disease.

Technic of Ovariotomy.—The incision is made midway between the pubis and the umbilicus, and the diagnosis confirmed by intra-abdominal examination of the tumor; peritoneal or intestinal adhesions are looked for and freed.

The patient is turned on the side, and "lap" towels moistened with warm salt solution are packed behind the edges of the incision to protect the wound from contamination by the cyst content. A trocar with a long rubber tube attached is plunged into the cyst and the fluid allowed to escape. As the cyst is evacuated and begins to collapse, the walls are grasped with ring clamps and the tumor drawn out of the abdomen. Manual pressure over the flanks by an assistant helps the evacuation. Often a large-sized aspirating apparatus may be used to advantage.

Internal cysts may be punctured and evacuated through the main cyst cavity. If required, the incision in the cyst wall may be enlarged and the hand introduced to break down the septa.

Adhesions are liberated as the cyst is drawn out. *In dense adhesions to the intestine* a portion of the outer wall of the cyst may, if necessary, be left attached upon the intestines.

The cyst contents must not be permitted to escape into the peritoneum, as they may be infectious or malignant.

Infected cysts and all cysts not too large are best removed intact.

The pedicle is clamped and cut and the vessels tied by their free ends or in continuity, transfixing the stump. The raw face of the stump is covered with peritoneum. Hemostasis must be assured before closure.

The opposite ovary should always be examined.

In oöphorectomy for carcinoma, sarcoma or papillomatous cyst, both ovaries and the uterus should, as a rule, be removed. In a young woman the second ovary may be left, if macroscopically normal, but the patient must be kept under observation.

Dermoids must always be removed without puncture, if possible.

Solid Tumors.—The operative technic requires no special consideration.

Intraligamentous Cysts.—Intraligamentous cysts may be removed by abdominal section. The vessels are ligated on either side of the tumor in the ovario-pelvic ligament and close to the uterus.

The peritoneal covering is incised in the least vascular portion and the cyst enucleated. If pedunculated, the pedicle is treated as in intraperitoneal cysts. In large cysts the contents may first be evacuated.

After removal of the tumor the peritoneal incision is closed with continuous sutures.

Vaginal ovariotomy is practicable in cases of small cysts, whether intraperitoneal or extraperitoneal. Intraligamentous cysts may sometimes be treated by evacuation through the vagina.

TUMORS OF THE ROUND LIGAMENT.

Tumors of the round ligament are rare. The commonest varieties are myoma and fibroma. They may be situated in any part of the ligament, oftener in the right than in the left. They grow slowly, but may rapidly increase in size during pregnancy. They are hard, smooth, generally pedunculated, and insensitive to pressure.

TUMORS OF THE BROAD LIGAMENT.

The following tumors have been observed in the broad ligament, *i. e.*, cystomata, myomata, lipomata, carcinomata and sarcomata. The nature of broad-ligament tumors cannot be determined prior to opening the abdomen.

CHAPTER XVII.

GONORRHEA AND STERILITY.

GONORRHEA.

General Considerations.—Gonorrhea is by far the commonest cause of pelvic disease in the female. It is often chronic or subacute from the beginning. Chronic gonorrheal infection is capable of producing greater ravages and permanent pathology than almost any other form of infection which affects women, and nearly 60 per cent of the deaths from pelvic disease *are due, directly or indirectly,* to gonorrhea, or the radical procedures necessary for the removal of resulting pathology. Bumm estimates that one-third of the cases of sterility are due to the gonococcus. The disease begins within twenty-four hours to eight days after unclean exposure. Its course is six weeks.

The primary seat of infection is generally in the urethra.

In a study of 200 cases Seifert found the urethra infected in 90 per cent, the cervix uteri in 37.5 per cent, and the vulvovaginal glands in 12 per cent.

Infection is especially persistent in the following locations: (1) In the cervix; (2) in the paraurethral glands (Skene's glands). Urethral infection *is the most persistent,* owing to the anatomical formation of these tubules; (3) In Bartholin's ducts.

Infection of the cervix and Skene's glands may be rekindled by irritation after a long period of latency, by sexual excesses, mechanical or chemical irritation. Married persons infected with the gonococcus may become more or less immune to their own particular organism, so that the symptoms and signs of the disease may subside completely. If these persons live apart from each other for a considerable period of time, upon resuming sexual intercourse a violent gonorrhœa may be set up in either individual, although both have been virtuous during their separation. Or if the infection is transferred from a married couple to a third person and then again to one of the original incumbents, the gonococcus will have become more virulent and is capable of producing a violent fresh infection in the recipients.

Extension usually occurs by continuity along the mucous surfaces, and very rarely by the lymph- or blood-stream though Wertheim has shown that the gonococcus can produce a reaction in the cellular tissues.

A complicating cystitis is comparatively common.

Vaginitis is infrequent except in children and old women.

The progress of the infection may be arrested at the internal uterine orifice; this is the rule in properly managed cases.

Invasion of the endometrium is favored by menstruation, the puerperal condition, and instrumentation when the os internum is patulous.

An endometrial infection generally spreads to the tubes or may stop at their uterine orifices.

The *usual affection of the ovary is perioöphoritis*, but the parenchyma may be involved by infection of a ruptured follicle.

The pelvic peritoneum is often infected by direct invasion from the tubes or by leakage from the oviducts, after the abdominal ostia are more or less completely closed.

Gonorrheal pelvic infection tends to remain localized and seldom spreads beyond the pelvis.

The gonococcus may live indefinitely in the deep epithelium, yet it becomes inert after six hours exposure to the air.

Summary of the Principal Lesions.—The gonococcus may produce any of the following lesions; urethritis; vulvitis, inflammation of vulvovaginal glands, vaginitis, endotrachelitis, endometritis, salpingitis; sometimes cystitis, ureteropyelitis, proctitis; pelvic peritonitis, oöphoritis, ovaritis, pelvic cellulitis, arthritis; rarely diffuse peritonitis, endocarditis, iritis, pleuritis and meningitis.

Symptoms.—The initial symptoms may be so mild that the patient may be unaware of the infection, this is particularly so in parous women where the cervix is the primary focus of infection, when an increase in the quantity of the leucorrheal discharge may be the only subjective evidence. However, the urethra is more often the seat of an initial attack of gonorrhea in the recently married woman than are the glands of Bartholin or the cervix, owing to the small introitus hence the *symptoms at the onset are often vesical* and the patient complains of *frequent and painful urination, a burning pain about the urinary meatus and a profuse purulent leucorrheal discharge.* The acuteness of these symptoms usually subside in the course of a few days, leaving a red swollen meatus with pouting paraurethral glands for in the subacute and chronic stage, the infection is localized in the Skene's glands, Bartholin's ducts or the cervix. The vagina itself is rarely attacked in the adult. With a history of recent suspicious coitus the pus from Skene's tubules, Bartholin's ducts and from the cervix should always be examined microscopically for the intracellular diplococcus of Neisser before a positive diagnosis as to the character of the infection is made.

Diagnosis.— *The clinical signs are leucorrhea, pus from the urethra, from the vulvovaginal glands, and often from the cervix uteri;* pus may be pressed out from the paraurethral glands or from the ducts of the vulvovaginal glands.

Gonorrheal macules, resembling in appearance flea bites, are commonly found about the mouths of Bartholin's ducts and about the vestibule near the paraurethral glands. Their presence *are usually diagnostic of infection.*

Persistent mucopurulent discharge from the cervix is most frequently of gonorrheal origin.

The infection is often subacute or chronic and the clinical signs hard to find.

In all cases the crucial test is the presence of the intracellular diplococcus giving a negative Gram stain *in smears* or scrapings from the urethra, the ducts of Bartholin, the cervix.

Treatment —*Acute infection* during the first few days needs no active measures.

Rest in bed, in the Fowler position; and the observance of a restricted diet, especially avoiding condiments, spices, alcoholic drinks and fat; adhering strictly to a milk or a skim-milk diet for two or three days favors diuresis. Pure water or mildly alkaline drinks should be given freely.

Moderate saline catharsis is permissible. Hexamethylenamin grain v, or helmitol, grain xv, t. i. d., or salol, grain v, q. 3 h, may be used to prevent infection of the bladder. Bromides, or hyoscyamus if required, may be administered to quiet the pain and restlessness.

No douching or sitz baths should be employed. The vulva should be cleansed every two to four hours with warm 4 per cent boric acid solution poured over it, and protected with a freshly laundered napkin which should be frequently changed.

Special warning must be given the patient of the dangers of communicating the infection to others and to her own eyes

Later after the acute smptoms have subsided *gonococcicides* are useful as argyrol, 10 to 20 per cent, soluble silver, 5 to 10 per cent, albargin, 0.5 to 3 per cent, potassium permanganate, 0.1 to 1 per cent. Application of the silver preparations may be made to the urethra, with a pipette, once daily, after urination; or to the vulva, on compresses which are changed frequently or to the vagina, *only when the vagina or cervix is infected,* by light packs moistened with the solution, or the vagina may be painted with the solution, which is allowed to dry and iodoform gauze used as a dry pack.

Extreme care is needed to prevent spreading the infection beyond diseased areas.

In Subacute or Chronic Gonorrhea.—Any of the following solutions may be employed: *Germicides,* as silver nitrate, 1 to 10 per cent; mercuric chloride, 1 to 10,000 to 1 to 1000; formaldehyde, 1 per cent, potassium permanganate, $\frac{1}{10}$ to 1 per cent; or *astringents:* as zinc chloride, 1 to 5 per cent, or alumnol, 15 per cent, zinc chloride, 1 to 5 per cent, ichthargan, 5 to 10 per cent.

Serum and Vaccine Therapy.—Gonorrheal antiserum or vaccine are useful in infection of bladder, uterus, tubes, peritoneum, and in gonorrheal arthritis, iritis, endocarditis, pleuritis, meningitis. The student is referred for further details to the description of gonorrheal infections as applied to special organs in the foregoing pages.

STERILITY.

Sterility is the inability on the part of a woman to produce a living child. It is considered *primary* or absolute when she has never been pregnant, *secondary* or relative when she has borne a child and then remains sterile.

A woman may be said to be sterile when conception does not occur within several years of marriage, provided no contraconceptive measures have been employed.

In the consideration of any case of barrenness in a woman, the physician must remember that there are four basic requisites to conception:

1. A healthy active spermatozoan, deposited in the posterior fornix or on the cervical portio.
2. A perfectly matured ovum.
3. A patent tubouterine tract to allow free transit of the spermatic particles to the outer third of the tube, and permit the passage of the ovum to its final resting place in the uterus.
4. Normal secretions in both man and woman with biochemical reactions which are not incompatible.

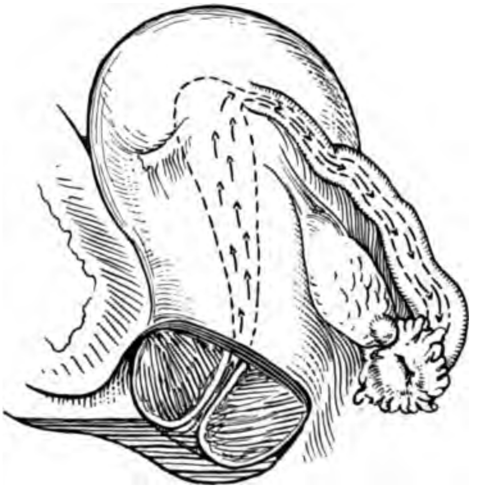


FIG. 131.—After coitus the healthy spermatozoön penetrates the cervical mucus; they pass through the uterus and tube to the outer portion where they lie in wait for the ovum to impregnate it.

Defects in one or more of these requisites will cause sterility.

Causes.—Developmental defects produce two-thirds of the cases. Acquired defects produce about one-third the cases, and are mostly due to gonorrhea. *About 8 per cent of marriages are sterile owing to gonorrhea and about 90 per cent of sterile women are married to men who have at some time had gonorrhea.*

Developmental defects on the part of the woman which may produce sterility are:

1. Partial or total absence of the genital organs.

2. Imperfect development of the ovaries; *hypoplasia* (in which the ova are few and defective). Noted in the hypothyroid type of women.

3. Arrested development of the uterine tubes (long or twisted tubes).

4. Tubal diverticula.

5. Arrested development of the uterus (in which imbedding of the fertilized ovum wholly or partly fails).

6. Marked anteflexion of the uterus.

7. Excessive length of the cervix (cervix not resting in the seminal lake).

8. Cervical stenosis.

9. Shallow vaginal vault (with no seminal lake about cervix).

10. Malformation of the vaginal orifice or of the external genitals.

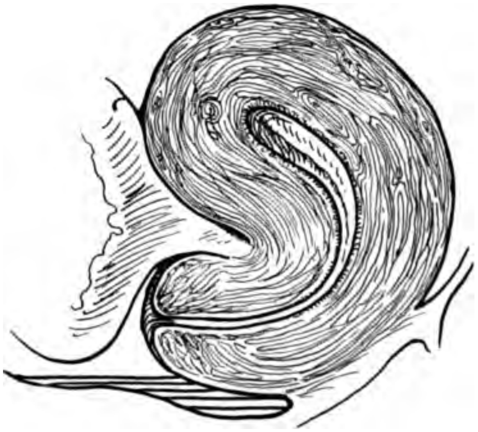


FIG. 132.—Anteflexion of the cervix as a cause of sterility. Cervix out of the seminal lake. Spermatozoa die in vaginal secretion.

Acquired defects which prevent conception are commonly the results of pelvic inflammation, such infections may close the tubal lumen, destroy the ciliated epithelium, cause infiltration of the tube-wall or produce occlusion of the abdominal ends of the tubes by adhesions, or a parametritis and pelvic peritonitis may so distort the tubes that they become angulated so that the sperm and ovum cannot meet.

Other causes may be new growths in tubes, uterine tumors occluding the tube lumen, or other occlusions.

Ovarian disease, rarely.

Adhesions of the ovaries; the result of pelvic inflammation.

Hyperinvolution or subinvolution of the uterus.

Uterine displacement (retrodeviations and prolapse).

Stenosis of the external or internal uterine orifice (hindering ingress of the male elements).

Extreme relaxation of the vaginal orifice, allowing the immediate escape of the semen.

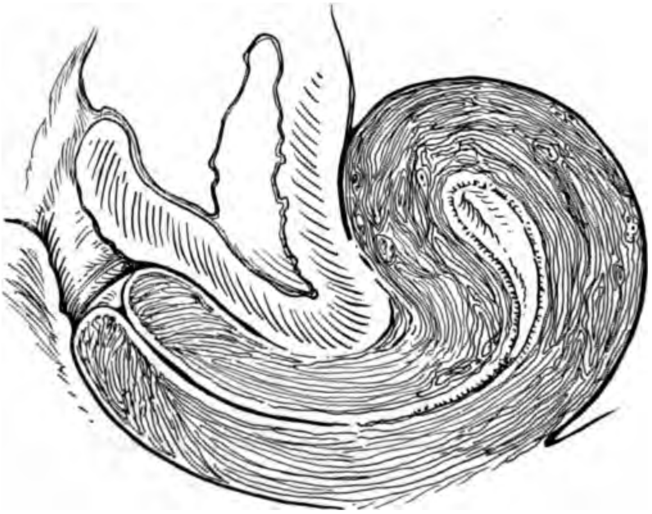


FIG. 133.—Infravaginal hypertrophy of the cervix in the axis of the vagina acting as a piston expelling the seminal discharge.

Abnormal uterine, cervical or vaginal secretion; or other discharges (marked acidity), often found in endocervicitis.

Other causes are marked obesity, extreme anemia, syphilis, alcoholism.

Treatment.—*The treatment in no case of sterility should be begun without first having made an examination of the male member of the partnership to demonstrate his potency,* as the man is responsible in about 25 per cent of the cases. Hühner has proposed an accurate and scientific plan for determining the virility of the male element.

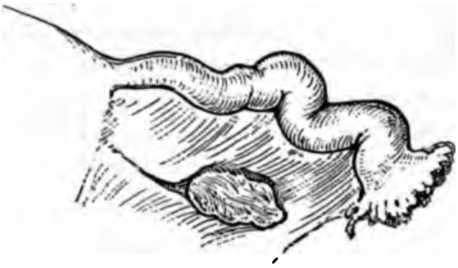


FIG. 134.—Cause of sterility in the ovary. The small atrophic ovary with few or no follicular elements.

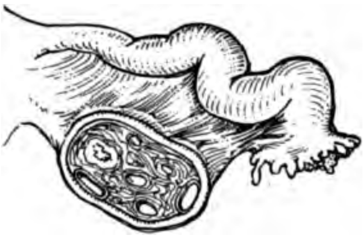


FIG. 135.—Cause of sterility in the ovary. The large white ovary with thickened tunic arresting maturation of the ovum.

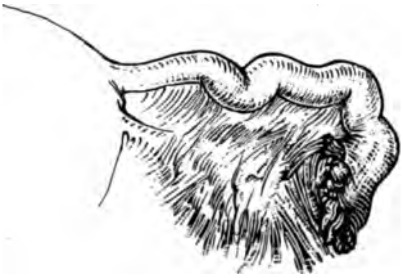


FIG. 136.—Perioöphoritis as a cause of sterility. The ovary buried in adhesions cannot deliver a matured ovum to the tube.

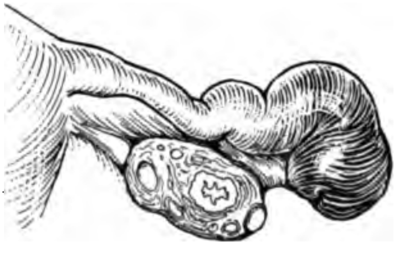


FIG. 137.—Tubal occlusion as a cause of sterility. The closed abdominal ostium prevents the ovum entering the tube.

He examines the vaginal, cervical and fundal secretions at varying periods of time, after coitus, to determine the presence and the condition of the spermatozoa in situ. Observation shows that spermatozoa deposited at the vulva die quickly—those in the vagina and on the portio within a few hours—but when the male element is found within the cervical canal they live much longer. Live, active spermatozoa have been found in the uterus five and six days after coitus, and in the distal portion of the tube, nearly a month after recorded intercourse. Apparently, therefore, it is the secretion at or about the cervix which offers the first real obstacle to the advance of the spermatozoa and subsequent impregnation.

In conducting the Hühner test, the wife presents herself for examination within an hour or two of coitus; if live spermatozoa are found in the vaginal vault, on the portio, or in the cervix the husband may be absolved from his part in the production of the sterility. The spermatozoa may die at the os or in the cervical canal or they may pass into the uterine cavity—when the sperm particle is found alive at the fundus, the cause of the sterility must necessarily be in the tubes or in the ovary.

Until recently we have had to depend upon the history of a previous infection, or abortion or curettage to determine the probable patency of the tubes.

In 1919 Rubin demonstrated that it was possible to pass oxygen or carbon dioxide gas through the tubes under low pressure and produce a pneumoperitoneum, if the tubes were open. By this method we can definitely demonstrate the patency or impatency of the tubes. This procedure, together with the Hühner test, to determine the activity and life of the male element has placed our treatment of sterility on a more rational basis. It is no longer justifiable to discise the cervix, dilate the cervix, curette the uterus, or introduce an intrauterine stem empirically in our attempt to cure sterility, before careful investigation of the mechanical factors has been made.

When sterility is due to acute flexion of the cervix with deep posterior invagination, as may be shown by finding no live spermatozoa above the point of flexion, discision of the posterior lips of the cervix (after Dudley), or amputation will place the cervical os in the seminal lake. The stem pessary is useful in anteflexion of the body with slight cervical invagination where there is no infection of the cervix and the sound shows that the uterus is of the infantile type.

Uterine displacements should be corrected by reposition and retained in normal position by properly fitting pessaries. Angulation of the tubes may be corrected by plastic operation, while occlusion of the tubes, where there is no infiltration of the tube wall may be remedied by reopening the abdominal ostia (salpingostomy), which is successful in about 7 per cent of the cases. Hysterosalpingostomy, or resection of the tube from the uterine cornu and implantation of the healthy portion of the tube into the uterus, gives a larger percentage of successes.

In bilateral hydrosalpinx, pyosalpinx, or severe chronic salpingitis, there is practically no hope from operation.

Undeveloped Uterus.—The uterus may be developed by galvanism, introducing the negative electrode into the uterus, the positive pole on the abdomen, with a dosage of 40 to 50 milliampères for five minutes, three times weekly.

Faradism stimulates the uterine circulation. Dilatation and the introduction of a glass stem may improve uterine development.

Chronic endometritis, or hyperplasia from chronic congestion frequently yields to curetting and sexual abstinence.

Stenosis of the internal uterine orifice may be corrected by dilation or division.

Stenosis of the external uterine orifice may be remedied by plastic operation (Pozzi).

If the cervix is too long, as in infravaginal hypertrophy, it may be amputated.

In a shallow vaginal fornix, systematic tamponing, or the employment of the mercury bag in the Trendelenburg posture or the ring pessary increases its depth.

For gonorrheal infection which changes the reaction of the vaginal secretion, an alkaline douche of sodium bicarbonate 1 dram to the quart, used before coitus, dissolves the mucus and furnishes an alkaline reaction to the cervical-vaginal discharges. When the ovaries are small and poorly developed, the outlook is always doubtful. The menstrual history and the physical characteristics of the woman, in these cases are suggestive of endocrinal disturbances.

The ovarian dysfunction may be stimulated by proper hygiene, exercise and the prolonged employment of the endocrine glands. Some observers, notably Bandler, claim numerous successes from polyglandular therapy.

In general it may be stated that the treatment of sterility is that of the cause, and this is often elusive.

Mechanical impediments to coitus in the vagina and vulva, such as rigid hymen, small introitus, septate vagina or atresia may occasionally be relieved by operation. *In extreme malformation of the genital organs all treatment is futile.*

Sterility in the male is often due to double epididymitis, and is possibly amenable to surgical measures.

Artificial insemination has been recommended in selected cases, but in the writer's experience has never been successful.

CHAPTER XVIII.

DISEASES OF THE URETHRA, BLADDER AND URETER.

URETHRITIS.

URETHRITIS is an inflammation of the urethral mucous membrane, generally caused by the gonococcus or due to mechanical or chemical irritants, especially the uncleanly use of instruments, and rarely to diphtheria, erysipelas, syphilis, tuberculosis.

Gonorrheal urethritis passes through an acute stage and then gradually becomes chronic. Urethral inflammation from other causes tends toward a spontaneous cure. Both acute and chronic urethritis may extend to and involve the vesical neck.

Symptoms.—The symptoms *in the acute stage* are frequent and burning urination, sometimes attended with slight bleeding and purulent discharge from the urethra. There is tenderness and thickening of the mucosa, and *often of the entire urethra*. The meatus is inflamed and swollen, with eversion of the mucosa. The *orifices of the paraurethral ducts are prominent, and pus can be expressed from them by digital pressure.*

In the chronic stage, the symptoms are similar to those of the acute, but with little or no burning or tenderness.

Diagnosis.—The diagnosis is easily made, for, except soon after urination, pus may be pressed out from the urethra. Endoscopic examination after the acute stage shows small ulcers or granular patches over the floor of the urethral mucosa. Bacterial examination of the discharge by smears or cultures should be especially made for the gonococcus.

Treatment.—The treatment in the acute stage is rest, the copious ingestion of water, frequent cleansing; saline laxatives, and a simple diet; salol, gr. v. q. 3 h., or hexamethylenamin, gr. 5 t. i. d., and avoidance of stimulating condiments and of alcohol.

In the subacute or chronic stage, santalwood oil, ♏x t. i. d., and daily applications of argyrol, in 10 to 30 per cent solution, to the mucosa with a pipette, especially in the gonorrheal form, or the application by instillation of astringents, *e. g.*, zinc sulphate, gr. j to iij, with hydrastin sulphate, gr. v to x ad ʒj, or the direct application through the endoscope of silver nitrate solutions to the ulcers and patches will generally give the desired relief.

For persistent suppuration in the urethral ducts, the tubule may be slit up from the vaginal side, and its base touched with strong carbolic acid, or better, the glandular structures may be destroyed with the fine point of the cautery knife.

STRICTURE OF THE URETHRA.

Stricture is rare. The causes, as in the male, are: gonorrhea; injuries in childbirth; cicatrization after operation on the the urethra or the use of strong caustics.

Symptoms.—The symptoms are vesical irritability, tenesmus, and dysuria.

Diagnosis.—The diagnosis is made by the "bougie à boule;" sometimes it may be felt by palpation through the vagina.

Treatment.—When the *stricture is at the meatus, gradual dilatation or incision;* when *higher up, dilatation.* A sound is passed every five days, increasing the size at each sitting until full dilatation is obtained.

PROLAPSE OF THE MUCOUS MEMBRANE.

Prolapse of mucous membrane is eversion or turning out of the urethral mucous membrane through the meatus. The urethral mucosa becomes loosened from the underlying tissues and protrudes through the external urinary meatus. The causes are vesical tenesmus from cystitis or calculus, together with a relaxed meatus resulting from the traumatisms at childbirth or the dragging downward of a urethral neoplasm.

Symptoms and Signs.—The symptoms are irritability of the bladder, dysuria, and *annular protrusion of the inflamed mucous membrane,* or eversion of the upper and lower walls.

Treatment.—The treatment is to remove the cause, followed by rest, replacement and retention of the prolapsed mucosa by astringent compresses. This failing, a longitudinal slit may be made in the floor of the urethra just behind the meatus opening upon the vaginal wall, the urethral mucosa is drawn out through it, the redundant mucosa cut away, and the urethral and vaginal wounds closed with sutures or four linear incisions may be made with the fine electric cautery knife in the long axis of the urethra, just within the meatus, the cicatrices resulting will invert the prolapsed mucosa. *Amputation of the prolapsed fold rarely gives permanent relief.*

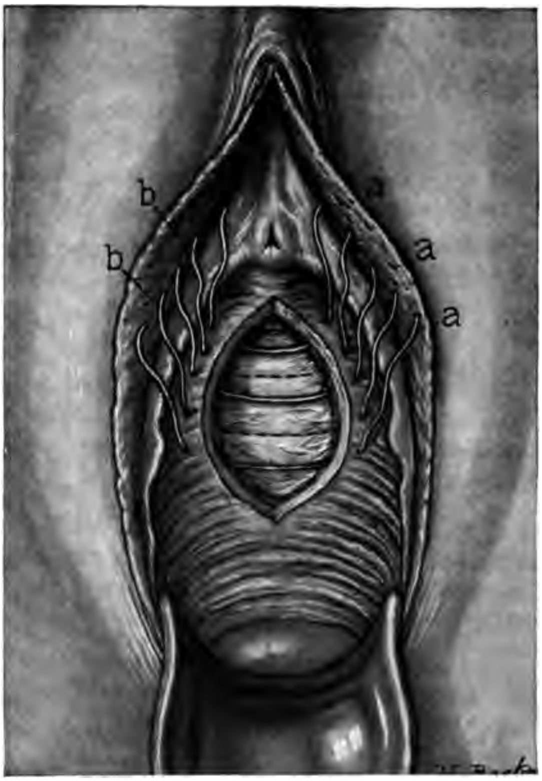


Fig. 138.—Baldy's operation for urinary incontinence due to dilatation of urethra. First step.

DILATATION OF THE URETHRA.

Dilatation of the urethra, with incontinence is most common in childbearing women and is usually the result of injury at labor to the muscle fibers of the vesicourethral sphincter. This may be from prolonged pressure or laceration. The urethra may also become dilated from repeated attempts at copulation.

Symptoms.—The patient complains of an inability to control the passage of urine on laughing, coughing or lifting.

The incontinence is very annoying.

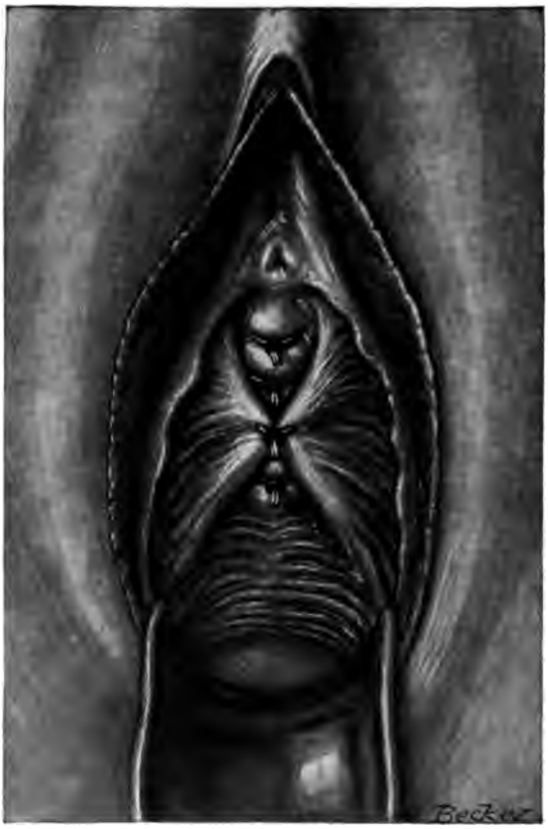


Fig. 139.—Baldy's operation. Second step.

Treatment.—The treatment is surgical; a cure may be effected by a triangular denudation in one anterior vaginal sulcus alongside of the lower end of the urethra, the urethra drawn strongly down to the denuded side as the wound is closed; the procedure is repeated on the opposite side after a few weeks, or by the plastic procedures of Kelly and Baldy which constricts the urethra at one point by attempting to restore the continuity of the vesical sphincter as illustrated by Figs. 138 and 139.

NEOPLASMS OF THE URETHRA.

The urethra may be the seat of benign and malignant growths.

The most frequent benign tumors of the urethra are cysts and polypi; malignant growths as carcinoma and sarcoma are rare.

Symptoms.—Frequent and painful urination with dysuria and occasional hematuria make up the symptom-complex, all urethral growths should have a histological examination.

Treatment.—Cysts or polypi are removed by torsion, ligation, or excision. Carcinoma and sarcoma are best treated with radium.

URETHROCELE.

Sacculation of the urethra occurs at the middle portion of the inferior wall. The sac becomes inflamed, owing to the decomposition of retained urine. The inflammation sometimes extends through the urethra and into the bladder.

Treatment.—Treatment consists in excision of the sac from the vaginal side; closure of the resulting fistula, *immediately if there is not much urethritis;* later, after its subsidence under treatment, if marked urethritis be present.

VESICOURETHRAL FISSURE.

Vesicourethral fissure is comparatively infrequent. It occurs usually as a crack or fissure in the mucous membrane near the vesical neck; it is longitudinal; has a yellowish-gray base and indurated edges. *Urination is extremely painful and the affected point exquisitely sensitive to pressure.*

Treatment.—The treatment is moderate dilatation and the application of the fine cautery point to the base of the fissure through a Kelly speculum. As a last resort, an artificial vesicovaginal fistula may be made.

SUBURETHRAL ABSCESS.

Suburethral abscess is an abscess in the urethrovaginal septum communicating with the urethra by means of a small opening.

Symptoms.—The principal symptoms are pain during defecation and urination, with dyspareunia and difficulty in walking because of the local sensitiveness. On examination *an ovoid tumor* is seen in the anterior vaginal wall just behind the meatus. The tumor is fluctuant, decreases in size on pressure, and pus can be expelled *via* the urethra. The endoscope will disclose the opening into the urethra.

Treatment.—The treatment is incision and drainage from the vaginal side, or incision and exsection of the sac wall.

CYSTITIS.

Cystitis is an inflammation of the bladder due to pathogenic organisms, the colon bacillus, gonococcus, and staphylococcus are the chief offenders. *It may be acute or chronic.* Chronic cystitis is often limited to the trigone (trigonitis).

The inflammation may involve the entire vesical mucosa in acute infection, but frequently in the subacute or chronic form exists only in patches, a half-inch to an inch and a half in diameter, especially at the trigone (trigonitis); these are eroded and granular and bleed easily.

Some general thickening of the bladder wall causing vesical contraction is commonly present in cases of long standing.

Ulceration at some point in the base may be found; sometimes there are phosphatic deposits. The ureters and kidneys, may be diseased by extension of the vesical infection. More often, however, the bladder inflammation is continued from the infection pouring down from above, this is especially so in the presence of pyelitis, pyelonephrosis and tuberculous kidney.

Causes.—The causes are predisposing and exciting. *The predisposing causes are trauma during labor from instrumentation or from other mechanical violence, foreign bodies, especially calculi, exposure to cold, retention of urine, residual urine, vesical neoplasms,* *pelvic inflammation, and systemic disease.* The exciting causes are the Bacillus coli communis, gonococcus, Bacillus tuberculosis, and certain other bacteria.

The avenues of invasion are the urethra or the ureter; or the infection may take place through the blood-channels, as in cystitis caused by the typhoid bacillus.

Symptoms.—The symptoms are severe in acute cystitis, mild usually in the chronic stage, *i. e.*, (1) *lumbar and vesical pain,* which is increased by standing or walking; (2) *frequent and painful urination;* (3) *tenesmus,* which is not wholly relieved by micturition; and sometimes (4) *fever in the acute stage.*

The urine is usually acid in the acute stage, while it may be *alkaline or neutral in chronic cystitis;* it contains mucopus, bladder epithelium sometimes blood, and is often fetid.

Diagnosis.—The diagnosis is made by the microscopic and the chemical characters of the urine, and in chronic cases by the cystoscope. In chronic cases tenderness and thickening of the bladder may be noted on bimanual examination.

Pus in the urine must be distinguished from the pyuria of pyelitis; there is usually much more albumin in the latter besides the physical signs, *i. e.*, tenderness over the kidney, tenderness at the costovertebral angle, and the painful shock of impact are available in pyelitis.

The specimen for diagnostic purposes must be a catheter specimen.

The urethra should be examined and the bacterial cause of the cystitis should, if possible, be determined.

Tubercular cystitis is characterized by *elevated patches, small gray tubercles, or ragged ulceration,* and the *tubercle bacilli in the urine. Tuberculosis should be suspected in chronic ulcerative cystitis, in cystitis of tuberculous subjects, and in non-gonorrheal cystitis in young persons.* It is almost invariably accompanied by renal tuberculosis. *The trigone is the site most frequently affected.*

The earliest symptoms of tuberculous cystitis are *frequent urination after meals and at night.* Occasionally traces of blood may be found in the urine.

The diagnostic signs are the demonstration of the tubercle bacilli in the urine and the development of tubercular lesions by inoculation of a guinea-pig with the urine.

Treatment.—The treatment in the acute stage is *rest, avoidance of cold,* and the *free ingestion of water* to dilute the urine; mild saline laxatives; the use of non-stimulating foods and drinks, especially milk; hot vaginal and rectal douches; hot fomentations over the suprapubic region; sandlewood oil, ♏x t. i. d., or hexamethylenamin, grains v. q. 4 h., in goblet of water; the administration of sweet spirits of niter, ʒss, hourly, contributes to relieve the pain.

If the urine is alkaline, its reaction may be changed by boric acid or benzoate of ammonium, grains x to xx t. i. d., or trichloracetic acid, ♏iij t. i. d., in water, may help; in hyperacidity, the free ingestion of mild alkaline drinks should be employed.

In moderate cystitis, ichthyol, as a rectal suppository, grains iij, may be used once daily.

Opium, with atropine or with tincture of hyoscyamus, ♏xx, when required to relieve the vesical spasm, is best used by the rectum.

In the chronic or subacute stage, sandlewood oil, ♏x t. i. d., or hexamethylenamin, grains viij, or helmitol, grains xv t. i. d., in a glass of water, or salol, grains v, every three hours in water, or saliformin, grains v, every four hours, may be employed.

A prolonged course of calomel, grains $\frac{1}{10}$ t. i. d., and salines, sometimes help, yet experience shows that little can be done in chronic cystitis except by the direct application of astringent solutions to the affected areas by (1) irrigation; (2) topical application.

Irrigation of the bladder with a half-saturated boric acid solution at a temperature 105° to 110° F. cleanses the vesical mucosa of mucus and pus, and may be followed with astringent applications, as silver nitrate solution, grain j ad ʒxx to grain j ad ʒiv, repeated every one to three days. The latter solution should be strong enough to cause slight pain; or sublimate solution, grain j ad ℥xxx to grain j ad ℥x daily, or 5 to 15 per cent alcohol solution daily, may be substituted.

Topical applications may be made directly to the diseased area through a Kelly speculum. With the patient in the knee-chest posture the trigone is in immediate relation to the tip of the speculum. The mucopus is first washed out with an irrigation of warm boric acid solution and the bladder surfaces dried. This is followed by the direct application of 3 to 15 per cent silver nitrate solution or 20 to 50 per cent argyrol once in two or three days.

Ulcers may be touched with the thermocautery or with strong carbolic acid, p. r. n.

Rarely cystotomy is indicated in refractory cases.

Technic.—With the patient in the Sims' or genupectoral posture, pass a curved sound per urethram and cut down upon its point *in the median line just above the trigone.* The incision may be one to one and a half inches in length. The operation is completed by stitching the vesical to the vaginal mucosa.

When a vesicovaginal fistula has been made for drainage, the bladder should be irrigated daily through the urethra with warm boric acid solution, the patient wearing a thick vulvar pad to absorb the urine. The fistula may be closed by operation after one to five or six months.

Excision of the diseased area of the bladder by suprapubic incision may be practised in intractable forms of disease, such as Hunner's ulcer.

In *tuberculous cystitis*, the instillation of guaiacol in olive oil, in a strength of 25 to 50 per cent, may be employed for the relief of pain; or the injection of iodoform suspended in mucilage may be used after each urination. An injection of 50 cm. of a 6 per cent carbolic acid solution, freshly prepared and allowed to remain in the bladder for three to four minutes, has a decided sedative effect; this injection may be repeated three or four times. Morphine in suppository may be needed for pain. Salol per os, and boric acid irrigation followed by instillation of gradually increasing strengths of silver nitrate solution should be continued until the urine is clear of pus.

Ulcers are touched with strong nitrate of silver solutions, as often as is necessary. Guaiacol carbonate, per os, in grains v doses t. i. d., may be given for weeks or months; or salol, grains v every three hours. Inoculation with bacterial vaccine has a curative effect in some bacteriurias.

The roentgen rays to the hypogastric and perineal regions relieve the pain. *All local treatment must be supplemented with general hygienic measures as in tuberculosis of other organs. In advanced tuberculous cystitis treatment is futile.*

VESICAL CALCULUS.

Vesical calculus is comparatively rare in women. The symptoms are the same as in the male, *i. e., frequent urination, pain, vesical tenesmus, and hematuria.*

Diagnosis.—The diagnosis is made as in the other sex, by the sound and cystoscopy; generally the stone may be detected by vaginal palpation.

Treatment.—The treatment of small or moderately large and friable stones *is crushing,* and washing out the débris; that of large stones, especially if there be much cystitis, are best *removed by vaginal incision.* As a rule, the incision should be left unclosed, thus allowing for vesical drainage and irrigation until the cystitis ubsides.

VESICAL NEOPLASMS.

Vesical neoplasms include papilloma, fibroma, myoma, lipoma dermoid cyst, sarcoma, and carcinoma. All are rare. Papilloma and especially carcinoma occur most frequently.

Symptoms.—The symptoms of vesical neoplasms are *hemorrhage, vesical tenesmus, frequent urination, and ultimately the symptoms of cystitis,* to which may sometimes be added those of ureteritis and nephritis.

Diagnosis.—The diagnosis is made by microscopical examination of a fragment of the growth removed through a Kelly cystoscope.

Distention of the bladder with a 1 to 4000 solution of adrenalin chloride controls the hemorrhage and makes cystoscopy possible.

Treatment.—Benign growths may be removed by the urethra, or by vaginal or by suprapubic cystotomy. In operations through the urethra or by vaginal incision, *the galvano-cautery knife or loop facilitates the control of the hemorrhage.*

Malignant growths when operable should be removed by suprapubic incision, supplemented by the roentgen ray and radium. *Papillomata may be destroyed by fulguration.* Inoperable growths may be temporarily arrested by suprapubic cystotomy and the implantation of radium needles in the substance of the tumor.

For the control of hemorrhage, silver nitrate, grain ½ to water ʒiv, or a 25 per cent solution of adrenal chloride 1 to 1000, may be injected into the bladder once in one to three days.

Cystalgia rarely is the only explanation of the vesical symptoms. The majority of irritable bladders have a definite pathological lesion as the cause of the disturbance. Some form of trigonitis will be found to explain many of the so-called functional polyurias.

URETERITIS.

Causes.—The causes of ureteritis are septic or gonorrheal infections, usually extending upward from the bladder, or tuberculosis which generally descends from the kidney, or it may be due to injuries in childbirth resulting in parametritis and consequent stricture, and foreign bodies in the ureter.

Symptoms and Signs.—The symptoms and signs are frequent urination, often increased at menstruation; the urine is cloudy and acid; in acute cases there is a high pulse and temperature. *There is usually pain and tenderness along the course of the ureter* and some sensitiveness over the kidney. Thickening of the vaginal portion of the ureter as felt in bimanual examination is sometimes evident in tuberculosis. *The ureteral orifice is inflamed and pouting,* as seen by cystoscopy.

Tuberculous infection is identified by the microscopical examination of a centrifuged urine or by the inoculation of a guinea-pig with 1 cc urine.

Treatment.—The treatment consists of hexamethylenamin, grains v to viij t. i. d., and the ingestion of plenty of pure water; opium, per rectum, if required for the relief of the pain, and the Fowler position.

In chronic ureteritis the ureter may require dilatation and flushing with a ureteral catheter. For the latter purpose a 2 per cent solution of boric acid may be used once in three days.

URETERAL CALCULUS.

A calculus, a fragment from a renal stone, may become impacted in any part of the ureter. The usual points of arrest are just after leaving the kidney pelvis, or at the pelvic brim or where the ureter passes through the parametrium.

Symptoms.—The symptoms are *ureteral colic, agonizing pain along the course of the ureter,* nausea and vomiting, rapid pulse, temperature and shock; the urine may be suppressed or diminished, and blood is found in the urine. *The roentgen rays or the waxed tipped ureteral catheter will usually demonstrate the position of the stone.*

Treatment.—The treatment is expectant or operative; the former is justified when the stone is small and there is not complete or persistent anuria on the affected side. Morphine, poultices, urotropine, and the copious ingestion of distilled water form the basis of the expectant plan. Ureteral stones which are impacted may be exposed and removed through the vagina when low down, or by extra- or transperitoneal incision when at or above the pelvic brim.

TREATMENT OF CHRONIC CONSTIPATION.

Chronic constipation is common in women and each case should be studied as to its cause. In women *colonic stasis, visceral ptosis,* and *dilatation of the sigmoid are frequent etiological factors.*

The principal non-surgical corrective measures to be employed are habit, exercise, massage, electricity, hydrotherapy, diet, abdominal support, enemata, *and last of all, drugs.*

Habit.—The observance of a fixed hour for the bowel movement is most important. The patient should go to the toilet once or twice daily; in the morning after breakfast or morning and evening. The toilet should be of proper height to allow for the proper straining action of the abdominal muscles.

Exercise.—The woman with habitual constipation should take deep breathing and abdominal exercises, night and morning after taking two glasses of water, the patient should lie upon a hard surface and raise the legs and thighs to a right angle with the body and then extend them with the abdominal muscles, this may be repeated from 25 to 100 times, as well as daily exercise in the open air; walking, riding and golfing are especially beneficial.

Massage.—Deep manual kneeding of the large bowel from the caput coli along the length of the colon, especially when at stool, or over the entire abdomen, sometimes stimulates the bowel action. Rolling a six-pound metal ball, covered with flannel, over the abdomen, especially along the course of the colon, for five to ten minutes daily, while the patient is in the dorsal position, often acts as a stimulus to the intestinal tract. The application of the mechanical electric *vibrator* over the abdomen for the same length of time daily, using long strokes, or with the rectal tip used in the bowel, sometimes gives results when the muscular tone is impaired.

Electricity.— *Galvanism,* employing electrodes eight inches square, placing the cathode over the abdomen, and the anode over the lumbosacral region, using from 50 to 75 milliampères for five minutes daily, may be tried.

Satisfactory results have been claimed from faradism, the strength of the current should be to the point of tolerance; or from the sinusoidal current, and the static induced current, employed in a similar manner. For further details the student is referred to the works on electrotherapeutics.

Posture.—In the presence of lax abdominal muscles with enteroptosis the patient should sleep with the foot of the bed elevated to relieve the circulatory stasis and use an abdominal supporter and avoid waist-band constriction.

Hydrotherapy.—A glass or two of water on rising, with or without the addition of a pinch of salt or a sitz bath, at a temperature of 55° to 70° F., for three minutes; or an alternating hot and cold spray to the abdomen for five minutes; or a tepid or cold bath on rising, followed by vigorous rubbing, contribute toward improving the intestinal and general tone.

Diet.—The diet may be selected from the following: coarse cereals, oatmeal porridge, corn mush, bran pudding, Graham bread, Boston brown bread, bran bread, corn bread, pumernickel, Swedish bread, fresh vegetables; moist fruits, raw, stewed or baked, *e. g.*, apples, prunes, plums, tamarinds, oranges, grapes, melons, tomatoes, currents, gooseberries, cranberries, marmalade, honey, molasses, treacle, milk-sugar and fats, as olive oil, a half ounce with the meals, butter, cream, caviar; sardines in oil; condiments in moderation; with a preponderance of carbohydrates and fatty foods. Carbonated water, lime juice, cider, buttermilk, kumyss, milk fermented with preparations of lactic acid bacilli, malted milk, whey. The selection should be governed by the idiosyncrasies and the taste of the patient. *Avoid foods containing tannin. Especially tea drinking.*

Enemata.—A rectal injection of lukewarm or cool water, to empty the rectum and sigmoid, using the least effective quantity, *seldom more than one pint,* improves the bowel tone; *harm is done by overdistention of the bowel.* An injection at bedtime of six or eight ounces of warm olive oil or sesame oil, to be retained overnight, best given with patient on side or back with the pelvis elevated, or in the knee-chest position, is often satisfactory; in difficult cases eight ounces of warm treacle may be successful.

The seat of rectal sense is close to the sphincter; therefore stretching or manipulating sphincter, with a rubber bougie, before attempts at stool, with soap, ox-gall, or glycerin suppositories may cause an evacuation.

Drugs.—Drugs should be used only in conjunction with the method previously mentioned—*they do not cure constipation*, their effect is temporary; among those of value may be mentioned: strychnine, gr. $\frac{1}{40}$ to $\frac{1}{60}$ t. i. d., belladonna extract, gr. $\frac{1}{8}$ to gr. $\frac{1}{3}$ t. i. d., eserin salicylate, gr. $\frac{1}{60}$ ounce to three times daily; *Russian mineral oil*, a tablespoonful t. i. d., artificial Carlsbad salt, half-teaspoonful in glass of water on rising; sodium phosphate, one to three teaspoonfuls in water; phenolphthalein, gr. j to gr. iv once daily; cascara sagrada, ♏v to xl of aromatic fluidextract once daily, or in tablets; in some cases $\frac{3}{10}$ to $\frac{1}{2}$ grain calomel tablets once a week or every ten days; rhubarb and soda; senna; pil. aloin, belladonna and strychnine; in chronic constipation with acne, creolin, gr. ij t. i. d.

In alternating constipation and diarrhea with colic, castor oil may be used in 25-gram capsules p. r. n., followed by agar in three or four doses daily. Drugs should be the last resort and should be used in the smallest effective doses.

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